Vol. 27 No 2 February 1992.

Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NICFOS

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The National Information Centre for Food Science and Technology (NICFOS), is a discipline oriented information service in Food Science, Technology and Nutrition. Set up in October 1977 at the Central Food Technological Research Institute (CFTRI), Mysore, it is one of the Sectoral Information Centres under the NISSAT of the Govt. of India, Dept. of Scientific and industrial Research.

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The Area Co-ordinator

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Mysore 570 013,

Karnataka, India.

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FOOD TECHNOLOGY Abstracts

Vol. 27 No.2 February 1992.

Central Food Technological Research Institute, Mysore
National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE AND TECHNOLOGY

CFTRI, MYSORE - 570 013

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FOOD TECHNOLOGY ABSTRACTS

Vol. 27 No. 2
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Central Food Technological Research Institute,
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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto [10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano [10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico [10^{-12}, as in pCi]
P	poise
p	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro- [as in µg, µm]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

249

Kumbhar (BK) and Singh (BPN). **Ways to increase profit margin or reduce product cost in a food industry.** *Indian Food Packer* 45(5): 1991: 19-28

The cost of processed products depend on raw material, harvesting method, packaging and transport system, grading, storage and ripening, processing and marketing. The profit margin could be increased if the cost of the raw material and processing costs are reduced. This paper suggests ways and means to increase productivity and reduce post-harvest loss and processing cost by efficient and judicious use of utilities like water, steam and electricity, refrigeration, capacity utilization and working condition in the plant. VKR

250

Nesvadba (P). **Increased supercooling in irradiated foods.** *International Journal of Food Science and Technology* 26(2): 1991: 165-171

The supercooling temp. of water-containing irradiated and non-irradiated foods vary within samples and statistically defined distributions are required to describe them. The distributions for irradiated and non-irradiated samples overlap. However, three out of four irradiated samples of different high water content foods show significantly lower mean supercooling temp. The supercooling temp. also change with storage time. It is possible that these observations could form the basis for a practical detection method for irradiated foods although much more work is required before clear conclusions can be drawn. Possible approaches are discussed. AS

251

Anon. **Fried foods stabilizer keeps moisture in and fat out.** *Prepared Foods* 160(3): 1991: 61

Research has proved that a cellulose food gum, hydroxypropyl methylcellulose can significantly lower the amount of oil absorbed by battered/breaded food during frying. GS

FOOD PROCESSING

252

Shimada (A), Kasai (M), Yamamoto (A) and Hatae (K). **Changes in the palatability of foods by hydrostatic pressurizing.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990: 511-519

Eleven kinds of foods (rice, soybean, sweet potato, Japanese radish, carrot, apple, pear, persimmon, beef and chicken) were pressurized at hydrostatic pressure of 5000 kg/cm ^{2} at room temp. for 10 min. Effect of pressurizing on appearance, odour, taste and texture of food was evaluated by sensory tests. Changes in hardness and colour were measured by a Texturometer and a Colour difference meter, resp. The fracture load and fracture deformation of Japanese radish were also measured by a Rheoner. The surface structures before and after pressurizing were observed by SEM. Furthermore, after pressurizing, the permeation rate of NaCl into Japanese radish during NaCl aqueous solution soaking and the browning rate of potato were studied. The appearance, odour, taste and texture of almost all foods changed by pressurizing except rice and soybean. The texture of potato and sweet potato turned to pliable and the sweeteness of sweet potato increased. Taproot vegetables increased in transparency and became pliable. The transparency and sweetness of the fruits increased. Gelatinization in potato starch was not observed. Pressurized Japanese radish absorbed more NaCl than controlled one. The browning rate of potato was accelerated by pressurizing. From these results, it is suggested that hydrostatic pressure will become one of the useful way for new food processing or cooking. AS

FOOD PACKAGING

253

Kozyrod (RP) and Ziaziaris (J). **A survey of plasticizer migration into foods.** *Journal of Food Protection* 52(8): 1989: 578-580

A survey of 184 samples of food packaged in a range of plastics was carried out to assess the incidence of plasticizer migration into foods. Food samples were screened for the plasticizers di-(2-ethylhexyl) adipate (DEHA), di-(2-ethylhexyl) phthalate (DEHP), and diisooctyl phthalate (DIOP) using GC. Only samples in contact with polyvinyl chloride (PVC) films were found to contain a detectable amount of DEHA. Of the 98 samples wrapped in PVC films, 44 (45%) showed levels of migration exceeding 30 mg/kg. In particular, significant quantities of DEHA were observed in cheeses which had been wrapped at the point of sale. DEHA was detected in 36 out of 38 samples (95%) of cheese wrapped in PVC film, with levels ranging from 31 to 429 mg/kg. Fresh meats packaged in PVC film gave positive results in 5 of the 42 samples analyzed (12%), with

levels ranging from 49 to 151 mg/kg. Migration of DEHA into other foods such as sandwiches was also observed, while some food types, such as frozen chicken, showed no detectable migration. AS

FOOD ENGINEERING AND EQUIPMENT

254

Kolbe (E) and Schnekenburger (R). **Temperature monitor for freezers and cold stores.** *International Journal of Refrigeration* 14(2): 1991: 117-119

A system has been developed to enable the measurement of important product temp. It consists of a commercial datalogger in a housing designed to protect it from freezer environment. The system is inexpensive, easy to assemble, portable, durable and easy to use; capable of recording and storing data at different rates throughout the given freezing or storage study; capable of supporting different sensors to enable a range of future applications; and capable of quick and straightforward data retrieval and processing. BV

255

Potschke (L), Handreck (B) and Maier (W). **Process engineering in a roller mill.** *Getreide-Mehl und Brot* 45(5): 1991: 135-140 (De)

ENERGY IN FOOD PROCESSING

256

Bekbolet (M). **Light effects on food.** *Journal of Food Protection* 53(5): 1990: 430-440

A review article highlighting current research studies carried out on light-induced changes in dairy products, fats and oils and meat products. In dairy products, riboflavin degradation, losses of vitamin A and C are the major effects, whereas in fats and oils the effective constituents are β-carotene, tocopherols, the undesirable flavours being related mainly to photosensitized oxidation. In case of meat products, the visual appearance seems to be the most important effect due to the formation of oxidised pigment metmyoglobin from oxymyoglobin upon light exposure. The effects of packaging materials and types on photooxidation are also being discussed for each of the above three food commodity groups. BV

FOOD CHEMISTRY AND ANALYSIS

257

Thakur (BR) and Arya (SS). **Role of sorbic acid in non-enzymatic browning reactions in liquid and solid model food systems.** *International Journal of Food Science and Technology* 26(2): 1991: 157-164

Role of sorbic acid (SA) in browning development in model systems has been studied. In liquid model systems containing water-glycerol-glucose (WGG), water-glycerol-sucrose (WGS), 45% sucrose and 30% sucrose plus 15% glucose, SA degraded when stored at 37 C forming brown pigments. Addition of amino acids (glycine or lysine monohydrochloride) increased the rate of browning development while CU^{2+} reduced SA degradation and browning development. In the absence of amino acids and SA, WGG and WGS systems did not brown appreciably. In solid systems with SA adsorbed on microcrystalline cellulose, the max. rate of browning occurred at 0.73 a_w, but max. rate of SA loss was at 1.0 a_w. In all systems inclusion of amino acids reduced SA degradation but increased browning development. The rate of SA-induced browning was considerably higher than that caused by sugar-amino acid interactions. AS

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

258

Notermans (S), Soentoro (PSS) and Delfgou-Van Asch (EHM). **Survival of pathogenic microorganisms in an egg-nog-like product containing 7% ethanol.** *International Journal of Food Microbiology* 10(3/4): 1990: 209-218

A liquor consisting of whole egg, saccharose (25% w/v) and ethanol (7.0% w/v) was artificially contaminated with *Salmonella enteritidis*, *S. typhimurium*, *Staphylococcus aureus* (three different strains), *Bacillus cereus* and *Listeria monocytogenes*. After 3 wks of incubation at 22 C the numbers of *Salmonella*, *S. aureus* and *L. monocytogenes* decreased more than 3 log 10 units. Under such conditions, however, the total number of microorganisms increased 3 log 10 units. At 4 C the decrease of pathogenic microorganisms was much slower and a decrease of 3 log 10 units was observed only after 7 wks of incubation. Egg-nog, without ethanol, incubated at 22 C allowed growth of *Salmonella* and *S. aureus*, while the numbers of *B. cereus* spores remained unchanged. Vegetative cells of *B. cereus* as well as *L. monocytogenes* decreased in numbers. However, after prolonged incubation the numbers of *L. monocytogenes* increased significantly. AS

Listeria monocytogenes

259

Buchanan (RL) and Phillips (JG). **Response surface model for predicting the effects of temperature, pH, sodium chloride content, sodium nitrite concentration and atmosphere on the growth of *Listeria monocytogenes*.** *Journal of Food Protection* 53(5): 1990: 370-376

A factorial plus supplemental central composite experimental design was used to assess quantitatively the effects and interactions of temp. (5 - 37 C), pH (4.5 - 7.5), NaCl (5 - 45 g/l), $NaNO_2$ (0 - 1000 µg/ml), and atm. (aerobic vs. anaerobic) on the growth kinetics of *Listeria monocytogenes* Scott A in Tryptose Phosphate Broth. A total of 709 growth curves were generated, with individual curves fitted using non-linear regression analysis in conjunction with the Gompertz function. The results were analyzed by response surface analysis to generate a cubic model to predict the growth of *L. monocytogenes* in response to any combination of the variables within the specified ranges. Evaluation of the model indicated that it can be used to provide reasonable "first estimates" of the impact of food formulation and storage conditions on the growth of *L. monocytogenes*, and can be automated readily to develop "user-friendly" software. AS

260

Palumbo (SA) and Williams (AC). **Effect of temperature, relative humidity suspending menstrua on the resistance of *Listeria monocytogenes* to drying.** *Journal of Food Protection* 53(5): 1990: 377-381

Studies on the ability of *Listeria monocytogenes* to survive dehydrated storage at different temp. (5 vs. 25 C) and rh (75, 59, 35, 14 and 1%) when suspended in different menstrua revealed that *L. monocytogenes* survived longer when held at 5 C as compared to 25 C, when suspended in beef extract, glycerol, karo syrup, skim milk and canned milk as compared to distilled water. Survival of *L. monocytogenes* tended to be longer at the lower rh. There was less than a 2 log $_{10}$ decline in the viable population (starting count ca. 10^5/coverslip) of *L. monocytogenes* when suspended in beef extract and held at 5 C and rh of 59% and below. This organism was not injured during drying storage at the various rh tested. The selective enumeration media permitted quantitative recovery of the organism dried on surfaces. The findings suggest that *L. monocytogenes* occurring as a contaminant in a food processing plant can persist for long periods in the plant environment, if the temp. is low and the organism is protected by food components. BV

261

Tiwari (NP) and Aldenrath (SG). **Isolation of *Listeria monocytogenes* from food products on four selective plating media.** *Journal of Food Protection* 53(5): 1990: 382-385

The suitability of four selective media - modified McBride Agar, Acriflavine-Ceftazidime Agar, Lithium chloride-phenylethanol-Moxalactane Agar (LPM), and Oxford Agar (OA) for isolation of *Listeria monocytogenes* 4b (81-861), 3a (7834) and 286 has been evaluated. Samples of cheese, processed meat, fresh vegetables and raw milk were inoculated with low numbers of *L. monocytogenes* cells. Inoculated samples were superior and gave higher recovery with all strains studied. Incubation of enrichment broth culture for 2 days was necessary to achieve a satisfactory level of performance. BV

262

Farrag (SA) and Marth (EH). **Behaviour of *Listeria monocytogenes* when incubated together with *Pseudomonas* species in tryptose broth at 7 and 13 C.** *Journal of Food Protection* 52(8): 1989: 536-539

Tryptose broth (TB) was inoculated with *Listeria monocytogenes* (strain Scott A or California), *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, or a combination of *L. monocytogenes* plus *Pseudomonas* species, and incubated at 7 or 13 C for 8 wks. McBride Listeria Agar was used to determine numbers of *L. monocytogenes* and *Pseudomonas* Isolation Agar to enumerate *Pseudomonas* species at 0, 7, 14, 28, 42 or 56 days. At 13 C, presence of *P. fluorescens* had a slight negative effect on growth of *L. monocytogenes* strain Scott A, and was somewhat detrimental to its survival during the extended incubation. Growth of *L. monocytogenes* strain California was retarded by presence of *P. fluorescens* although the max. population achieved by the pathogen was greater in the presence rather than absence of the pseudomonad: the pseudomonad did have a negative effect on survival of the pathogen. At the same temp., *P. aeruginosa* had a negative effect on survival of *L. monocytogenes* strain California, but had essentially no effect on the other strain of the pathogen. Neither strain of *L. monocyotgenes* affected growth of *P. fluorescens* nor *P. aeruginosa*. At 13 C the pH of TB generally decreased when *L. monocytogenes* grew by itself but increased when either pseudomonad grew by itself or together with the pathogen. At 7 C, growth of both pseudomonads was minimal. Presence of non-growing cells of *P.*

fluorescens retarded somewhat growth of both *L. monocytogenes* strains early during the incubation. *P. aeruginosa* had no detectable effect on either strain of *L. monocytogenes*. The pH of TB decreased when *L. monocytogenes* grew by itself or together with either pseudomonad, and remained unchanged in TB inoculated with either pseudomonad. AS

263

Sorrells (KM), Enigl (DC) and Hatfield (JR). **Effect of pH, acidulant, time and temperature on the growth and survival of *Listeria monocytogenes*.** *Journal of Food Protection* 52(8); 1989; 571-573

The effect of different acids, pH, incubation time and incubation temp. on the growth and survival of four strains of *Listeria monocytogenes* in tryptic soy broth was compared. Hydrochloric acid (HCl), acetic acid (AA), lactic acid (LA), malic acid (MA), and citric acid (CA) were used to acidify tryptic soy broth to pH values 4.4, 4.6, 4.8, 5.0 and 5.2 pH. Incubation times were 1, 3, 7, 14 and 28 days at 10, 25 and 35 C. The inhibition of *L. monocyotogenes* in the presence of high acidity appears to be a function of acid and incubation temp. Based on equal pH values, the antimicrobial activity is AA > LA > CA greater than or equal to MA > HCl at all incubation times and temp. When based on equal molar concn., the activity appeared to be CA greater than or equal to MA > LA greater than or equal to AA > HCl at 35 and 25 C, and MA > CA > AA greater than or equal to LA > HCl at 10 C. Greatest antimicrobial activity occurred at 35 C. Greatest survival occurred at 10 C and greatest growth occurred at 25 C. Final pH of the medium was as low as 3.8 in HCl at 28 days. All strains grew well at pH values lower than the min. previously reported (5.5 - 5.6). AS

Pseudomonas aeruginosa

264

Burke (RM), Upton (ME) and McLoughlin (AJ). **Influence of pigment production on resistance to ultraviolet irradiation in *Pseudomonas aeruginosa* ATCC 10145.** *Irish Journal of Food Science and Technology* 14(1); 1990; 51-60

Pseudomonas fluorescens

265

Fortina (MG), Pagliarini (E) and Manachini (PL). **Heat resistant protease from *Pseudomonas fluorescens* MFP $_1$.** *Italian Journal of Food Science* 1(3); 1989; 63-70

The production of heat resistant proteases by psychrotrophic microorganisms isolated from raw milk and the resistance of such proteases to ultra-high temp. were studied. Protease production by *P. fluorescens* strain MFP $_1$, chosen as the model, was influenced by nitrogen source and inoculum size. The secretion of protease occurred at both 4 and 22 C and decreased markedly at 30 C. The protease MFP $_1$ showed max. activity against casein substrate at pH 7.5 and 45 C. It was inactivated in milk on heating at 55 or 60 C for 30 min, but was resistant to heat treatment at 110 to 135 C. At 135 C, the protease D value was about 8 times greater than the D value of *Bacullus stearothermophilus* spores. AS

Staphylococcus

266

Kamat (MY), Sulebele (G) and Nirupama Sabnis. **A comparative evaluation of media for enumeration of enterotoxigenic staphylococci by selective enrichment technique.** *Journal of Food Science and Technology (India)* 28(6); 1991; 381-383

Two enrichment media namely, Giolitti Cantoni's Tellurite broth (TEB) and Raj's Mannitol Salt Sorbic Acid (MSSA) broth were compared from selective isolation of enterotoxigenic Staphylococci from food samples. With the limited number of samples screened, the present findings indicate that Raj's MSSA medium has a distinct advantage for dairy products over TEB medium. AS

Staphylococcus aureus

267

Khalil (H) and Villota (R). **The effect of microwave sublethal heating on the ribonucleic acids of *Staphylococcus aureus*.** *Journal of Food Protection* 52(8); 1989; 544-548

The effect of microwave sublethal heat injury on the integrity of *S. aureus* FRI-100 RNA was examined. The extent of damage to RNA during sublethal microwave heat injury was greater than that occurring as a result of conventional sublethal heating. Although both heating modes resulted in the destruction of the 16S RNA, only those cells heated with microwave energy suffered lesions in their 23S RNA. When cells were allowed to recover, the conventionally heated cells regained normal profiles of the 16S and the 23S RNA after 180 min on the recovery medium. Microwave heated cells restored their 16S RNA after 180 min of recovery. Microwave-injured cells required 270 min to have 23S RNA with sedimentation properties similar to those found in the unheated cells. AS

Fungi

Aspergillus parasiticus

268

Karapinar (M). **Inhibitory effects of anethole and eugenol on the growth and toxin production of *Aspergillus parasiticus*.** *International Journal of Food Microbiology* 10(3/4): 1990: 193-200

Anethole, up to concn. of 400 µg/ml delayed growth and reduced mycelial wt. was observed, but it showed a stimulative effect on the toxin production of both strains. At a concn. of 300 µg/ml, eugenol inhibited the growth of two strains; level of eugenol below 200 µg/ml enhanced production of aflatoxin particularly by *Aspergillus parasiticus* NRRL 299. BV

Mushrooms

269

Okereke (A), Beelman (RB), Huhtanen (CN) and Miller (AJ). **Acid-blanching and EDTA reduce spoilage and toxigenesis of canned mushroom inoculated with proteolytic *Clostridium botulinum* types A and B spores.** *Journal of Food Protection* 53(5): 1990: 425-427

A new process involving acid-blanching and addition of EDTA to the canning brine (ABC) was compared with the standard commercial method (SCM) for the control of *C. botulinium* spores in canned mushrooms. Fresh mushrooms were uniformly inoculated under vacuum with 10^5 spores of proteolytic strains of *C. botulinum* types A and B and processed either by ABC or SCM method. Compared to SCM the ABC process significantly reduced the spoilage and toxigenesis of canned products. At F_0 values of 0.5, 2 and 4, the ABC when compared to the SCM process reduced percent spoilage from 91.4 to 51.5, 17.6 to 6.3 and 12.1 to 2.9 resp. No botulinal toxicity occurred except at F_0 of 0.5 when the number of toxic cans was reduced from 54.3 to 30.3 by the ABC, compared to SCM. AS

BIOTECHNOLOGY

270

Bajaj (VK), Rai (T) and Kanawjia (SK). **Biotechnological applications for analysis of food and food additives.** *Indian Dairyman* 43(11): 1991: 505-513

Biotechnological methods in food analysis, microbiological methods, cell and tissue culture methods, immuno-chemical methods, and the use of enzyme as analytical tools like enzyme electrodes/sensors and indicator enzymes are the aspects covered. SRA

271

Gharpure (YH). **Biotechnology - emerging technologies.** *Chemical Age of India* 41(2): 1990: 77-81

Historical background, present state of art, enzyme production, fermentation products, fermentation facilities, computerisation of fermentation, genetic engineering (protein engineering), major applications (agriculture, food additives) and future are the aspects highlighted in this article. SRA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

272

Nakatani (N). **Recent advances in the study on natural antioxidants.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990: 569-576

Colourants

Dyes

273

Sudhir Singh and Khanna (SK). **Toxicological evaluation of permitted food colours. Part IV. Indigoid dye (blue).** *Indian Dairyman* 43(11): 1991: 501-504

Article reviews short and long term studies conducted on toxicological evaluation of indigo caramine (C.I. food blue 1) as food colouring agent in pigs, female beagle dogs, male and female mice, and on human volunteers. The study covers teratogenic, mutagenic and carcinogenic effects. SRA

Annato

274
Aparnathi (KD) and Sharma (RS). **Analytical aspects of annato colour for food.** *Indian Food Packer* 45(4): 1991: 42-48

Analytical aspects of annato (*Bixa orellana* L) colour have been reviewed including extraction, resolution techniques, detection and detn. methodologies. VKR

Tartrazine

275
Sudhir Singh. **Technological aspects of tartrazine: An overall perspective.** *Indian Dairyman* 43(10): 1991: 473-476

This article briefly presents information on the characteristics, principles involved in manufacture, per capita consumption, and the metabolite fate of tartrazine in the system. SRA

Xanthene

276
Sudhir Singh, Khanna (SK) and Mathur (BN). **Toxicological evaluation of permitted food colours. Part III. Xanthene dye (red).** *Indian Dairyman* 43(10): 1991: 465-469

A review of the toxicological work carried out to assess the safety of red xanthene dye (erythrosine). The work carried out so far on short term studies indicated that no harmful effect of erythrosine at 0.02% was observed in rats, dogs, gerbils and pigs. Long term studies conclusively showed that no adverse effect was observed in mortality, haematology gross pathology, and histopathology to mice rats, gerbils and dogs at a max. limit of 0.02% in the food products. However, hepatic cirrhosis was observed in female rats exposed at 4% or more levels of erythrosine for periods upto 18 months. Erythrosine inhibited various digestive enzymes. Carcinogenicity with oral and subcutaneous administration, studies conducted with protein bound iodine and also the allergic action of erythrosine have been mentioned. The inhibitory action of erythrosine on enzyme systems has also been indicated. SRA

Flavourings

277
Pons (I), Garrault (C), Jaubert (J-N), Morel (J) and Fenyo (J-C). **Analysis of aromatic caramel.** *Food Chemistry* 39(3): 1991: 311-320

A new device is presented in this paper using a continuous trapping on adsorbent when heating, followed by a thermal desorption and overall analysis. 57 compounds were detected by this technique and also by solvent extraction and vapour analysis during cooking. Some unexpected intermediate volatile molecules were noted which can play an important role in the formation of the flavouring compounds. BV

CEREALS

278
He (H) and Hoseney (RC). **Gas retention of different cereal flours.** *Cereal Chemistry* 68(4): 1991: 334-336

Wheat, rye, rice and corn flours were compared for their bread-baking properties. Only wheat flour formed a viscoelastic dough and produced a light-textured loaf. Differences in gassing power among the four cereal flours were not sufficient to explain the differences in loaf volume. Measurement of CO_2 released from doughs using an electric resistance oven showed that over the periods of fermentation, proofing, and baking, wheat flour dough retained gas until heated to 72 C during baking, whereas the other doughs started releasing gas during fermentation or proofing. The flours released gas as follows, in decreasing order: corn, rice, rye, wheat. Loaf volume was in the reverse order, indicating that the gas retention ability of dough mainly determined the loaf volume of these cereal flours. AS

Buckwheat

279
Tsuzuki (W), Ogata (Y), Akasaka (K), Shibata (S) and Suzuki (T). **Fatty acid composition of selected buckwheat species by fluorometric high-performance liquid chromatography.** *Cereal Chemistry* 68(4): 1991: 365-369

The fatty acid composition of buckwheat seeds, including the tartary species, was analyzed by HPLC using 9-bromomethylacridine (9-Br-Ma) as a flourescent labeling reagent for the carboxyl group. In a comparison with the common species, tartary was characterized in relation to the amount of C18:3 fatty acids and those with 20 or more carbons. The values obtained by combining fluorometry and HPLC were compared with those obtained by GC.

The values of both methods were in good agreement, although slight differences were found in the C16:0 and C24:0 fatty acid contents. These results suggest that the combination of fluorometry and HPLC is a highly sensitive, simple procedure for determining the fatty acid composition of buckwheat seeds. AS

280

Ikeda (K), Sakaguchi (T), Kusano (T) and Yasumoto (K). **Endogenous factors affecting protein digestibility in buckwheat.** *Cereal Chemistry* 68(4): 1991: 424-427

Endogenous factors affecting protein digestibility of buckwheat were studied. High levels of protease inhibitor and tannin, which are inhibitory factors of protein digestibility, were found in various buckwheat products. A significant difference in susceptibility to proteolytic action among buckwheat protein components was noted, with the globulins being more digestible by proteases than the albumins. These findings indicate that the protein digestibility of buckwheat is defined by two factors: the inhibitory potency of endogenous antinutrients, such as protease inhibitor and tannin, and the susceptibility of protein per se to proteolytic action. AS

Oats

281

Yiu (SH), Weisz (J) and Wood (PJ). **Comparison of the effects of microwave and conventional cooking on starch and β-glucan in rolled oats.** *Cereal Chemistry* 68(4): 1991: 372-375

Rolled-oat porridge was prepared by conventional and microwave cooking to determine and compare the effects of these cooking methods on the texture, viscosity and amounts of dispersed gelatinized starch and solubilized (1-3)(1-4)-β-D-glucan (β-glucan). The porridge prepared by microwave cooking was generally more grainy and less viscous than that prepared by the conventional method. Microwave cooking produced relatively less dispersed gelatinized starch and less solubilized β-glucan than did conventional cooking. The difference was slight with short cooking duration (1 min) but increased drastically with prolonged cooking (20 min). Thicker oat flakes (regular-cooking rolled oats) released less solubilized β-glucan and gelatinized starch than did thinner oat flakes (quick-cooking rolled oats) upon cooking. Microscopic examination revealed that the two cooking methods had different effects on the structural organization of oats. Rolled oats prepared by microwave cooking contained starch granules that were smaller in vol. and less convoluted in structure than those conventionally cooked. Furthermore, the cell wall of the former was less disrupted. These differences may have been due to the effect of stirring: the microwave-heated rolled oats were stirred relatively less than were the conventionally cooked samples. AS

Paddy

282

Kulkarni (SD) and Bal (S). **Kinetics of liquid water absorption by evacuated paddy grains.** *Journal of Food Science and Technology (India)* 28(6): 1991: 341-344

An empirical equation correlating moisture content to duration of soaking in water at 30 - 80 C was developed for evacuated paddy. The equation was based on generalised mathematical equation developed for direct soaking of paddy. The predicted and experimental values of moisture content were non-significant for entire range of this study at 0.5% level of significance. The developed equation therefore can be directly used for prediction of moisture content of paddy soaked in water, after evacuation, in the temp. range of 30 - 70 C for soaking duration upto 6 h and 2 h for 80 C. AS

283

Donahaye (E), Navarro (S), Ziv (A), Blauschild (Y) and Weerasinghe (D). **Storage of paddy in hermetically sealed plastic liners in Sri Lanka.** *Tropical Science* 31(2): 1991: 109-121

A trial was carried out in Sri Lanka on the outdoor storage for 6 months of locally grown paddy (type Nadu) in two hermetically sealed flexible liners termed 'storage cubes'. Insect infestations failed to develop in both cubes and TGM evaluations indicated a 0.33 - 0.64% loss in dry wt. due to metabolic activity. In one of the cubes, which contained paddy at higher moisture contents, a moisture condensation effect was revealed on the under-side of the upper liner. Losses by mould development resulting from this effect were estimated at 1.24%. Means for obviating this occurrence are proposed. AS

284

Mastan Pasha (M), Anu Appaiah and Karanth (NGK). **Efficacy of thiram as a seed dressing fungicide and its effect on seedling vigour of paddy.** *Tropical Science* 31(2): 1991: 123-130

Paddy seed treatment with 0.2% thiram prevented fungal infection during storage for 150 days. Initial degradation of the fungicide was rapid and more than 50% disappeared in 2 wks. Thereafter,

breakdown was slow, with the result that 200 p.p.m. was recovered after 5 months. Efficacy of the fungitoxicant varied depending on the fungus and the procedure of evaluation. Thiram treatment as a dusting or slurry was superior to the steeping method. The former two preserved germination and seedling vigour. AS

Rice

285

Verma (RA) and Uttam (JR). **Studies on the susceptibility of rice varieties to *Sitotroga cerealella* Oliv.** *Bulletin of Grain Technology* 28(1): 1990: 22-24

The relative resistance of 16 var. of rice was tested against *S. cerealella* Oliv. in the lab. by assessing the damaged grain %, loss in grain wt. and mean adult population/500 grains over a storage period of 80 days at 27 plus or minus 2 C in 1985. The seeds of Usar 1, Ashwini, Jaya and I.R. 8 were least susceptible to the pest while CR 237-1, Bansmati 370, T_{23}, T_3 and Prasad were most susceptible. The seeds of other rice var. were moderately susceptible to the insect. Seeds of none of the rice var. tested were resistant to *S. cerealella* Oliv. KAR

286

Roy (MK), Ghosh (SK) and Chatterjee (SR). **Gamma-irradiation of rice grains.** *Journal of Food Science and Technology (India)* 28(6): 1991: 337-340

Rice grains of the var., 'Pusa-33', at 12.0% moisture, were irradiated with doses of 0 - 150 kGy. The crystallinity of starch, soluble amylose and yellowness of treated grains increased with increment in the dose of radiation but water adsorption and vol. expansion on cooking decreased. Irradiation at doses of 3 - 5 kGy increased inperceptibly the hardening of rice cooled after cooking, but had no effect on edibility. The off-aroma in irradiated grains was perceptible at doses higher than 5 kGy. The changes in colour and aroma persisted also on cooking. Upto a dose of 5 kGy, the sensory scores of rice, both cooked and uncooked, were at or above acceptable limit of score (5.5). The doses of 3 and 5 kGy were highly effective in reducing fungal population in irradiated grains, but in view of the changes in colour and cooking qualities, 3 kGy is the preferred dose-limit of irradiation. AS

287

Amarjeet Kaur, Sekhon (KS) and Nagi (HPS). **Parboiling of rice: Effect on physicochemical, milling and cooking properties.** *Journal of Food Science and Technology (India)* 28(6): 1991: 384-385

Parboiling treatments of paddy var. HM-95, Jaya, Basmati-370, PR-103, PR-106 and PR-107 improved head rice recoveries and pressure parboiling (steaming for 20 min at 15 lb/square in. pressure) proved to be more beneficial in increasing the head rice yield and reducing the free fatty acid content. Varieties and treatments had a significant effect on mean length/breadth ratio of milled rice kernels. Parboiling brought about increase in amylose content as compared to control. Traditionally parboiled rice required less time for cooking than pressure parboiled rice. Parboiling treatment increased elongation ratio and reduced the losses of solids and gruel upon cooking. AS

288

Zaman (MA) and Bala (BK). **Thin layer solar drying of rough rice.** *Solar Energy* 42(2): 1989: 167-171

This paper presents a set of simple empirical equations for natural air flow solar drying of rough rice mixed-mode type dryer, box-type dryer and open floor drying system. The moisture contents predicted by the equations were in good agreement with the observed values. The effect of drying air temp. on the drying rate constants for these cases were found to be insignificant. The equilibrium moisture content appeared to be the most important variable controlling the drying rate. The highest drying rate was observed in case of mixed-mode dryer. The drying rate of box dryer was next to that of mixed-mode dryer. This study shows that the introduction of solar dryer for drying of rough rice is highly recommendable in Bangladesh. AS

289

Firmin (A). **Quality characteristics of fifteen rice varieties grown in the ivory coast.** *Food Chemistry* 39(3): 1991: 357-362

Fifteen var. of rice grown in the ivory coast were evaluated for chem. and physical characteristics. The protein contents of these var. ranged from 6.10% to 8.57% and that of carbohydrate from 67.7% to 75.5%. Moisture and ash levels varied from 9.0 to 12.5% and 0.56% to 1.80% resp. all var. had long and slender grains. Yields of whole-kernel varied widely depending on var., grain type and milling conditions. BV

290

Villareal (CP), Maranville (JW) and Juliano (BO). **Nutrient content and retention during milling of brown rices from the International Rice Research Institute.** *Cereal Chemistry* 68(4): 1991: 437-439

The nutrient content and retention during milling of brown rice was determined by energy-dispersive X-ray fluorescence spectrometry of elements on seven International Rice Research Institute (IR) rices differing in starch properties. With 10% bran-polish removal, milled rice retained 13% thiamine; 46% riboflavin; 33 - 50% crude ash, P, K, Mg, Si and Mn; 54 - 66% Ca, Fe and Zn; and 82 - 90% Kjeldahl nitrogen, Al, S and Cl. Mean Si level in milled rice was 0.015%. Nutrient content and retention during milling of IR brown rices were similar to those of other brown rices. AS

291

Khan (TN) and Reddy (NS). **Quality attributes of four rice varieties.** *International Journal of Food Science and Technology* 26(2): 1991: 153-156

Four var. of rice (*Oryza sativa* L., MAU-Sel-1, MAU-Sel-9, PBM-1 and Ambemohar) were studied for physical and chemical characteristics and cooking, eating, milling and nutritive qualities. A little variation in gel consistency and gelatinization temp., but there were marked differences in water absorption, vol. expansion and percentage of leach loss. Ambemohar var. was less acceptable. Of the 4 var. MAU-Sel-9 was found to be superior to the other three var. of rice for physical, chemical, eating quality and protein content. BV

Wheat

292

Gupta (RB), Bekes (F) and Wrigley (CW). **Prediction of physical dough properties from glutenin subunit composition in bread wheats: Correlation studies.** *Cereal Chemistry* 68(4): 1991: 328-333

The low and high mol. wt. (LMW and HMW) subunit allelic composition of two sets of bread wheat genotypes (48 Australian cvs and 53 genotypes from around the world) were compared according to the quality parameters of their dough as measured by extensigraph. The HMW subunits correlated more strongly ($r = 0.75$, $P < 0.001$) with max. dough resistance (Rmax) than did the LMW subunits of glutenin ($r = 0.56$, $P < 0.0001$) in the world set. Conversely, the LMW subunits in the Australian wheats correlated more strongly ($r = 0.72$, $P < 0.001$) with Rmax than did the HMW subunits of glutenin ($r = 0.48$, $P < 0.01$). Dough extensibility (Ext) correlated equally with LMW ($r = 0.44$, $P < 0.001$) or HMW ($r = 0.43$, $P < 0.01$) glutenin subunits in the world set, but in the Australian wheat set, it showed significant correlation only with LMW subunits ($r = 0.54$, $P < 0.001$). However, in both sets of wheat, the highest correlation coeff. between predicted and actual Rmax and Ext were obtained when predictions were based on LMW and HMW subunits together. An effective predictive model of dough properties should therefore be based on the composition of both LMW and HMW glutenin subunits. Predictive formulas are presented, based on the wheat sets examined, to estimate Rmax and Ext; the factors involved for each locus provide a measure of the predictive value of the six glutenin subunit loci. The HMW glutenin subunits loci generally made a bigger contribution to Rmax values than did the LMW glutenin loci. AS

293

Keagy (PM) and Schatzki (TF). **Effect of image resolution on insect detection in wheat radiographs.** *Cereal Chemistry* 68(4): 1991: 339-343

Wheat kernels were exposed for three days to adults of three insect species (*Sitophilus zeamais* Motschulsky [maize weevil], *Rhyzopertha dominica* (F.) [lesser grain borer], and *Sitotroga cerealella* (Oliv.) [Angoumois grain moth]); the kernels were incubated and X-rayed to produce contact films at 3- to 4-day intervals. The objective was to develop specifications for automated grain-inspection systems and evaluate the effectiveness of current radiographic methods. X-ray images of infested and uninfested kernels were presented to four trained subjects as original films and digitized video images at four magnifications corresponding to 32.8, 65.6, 131.2, and 262.4 µm of film per pixel. Insect detection was a sigmoidal function of insect age. The age required for 50% detection varied linearly with log pixel size (µm of film per pixel). Visual detection from the original films was similar to that from the 65.6 µm/pixel resolution. Ages for equivalent detection increased from the maize weevil to the Angoumois grain moth to the lesser grain borer, reflecting the rate of maturation of the individual species. Development of an automated image-acquisition system equivalent to visual inspection will depend on the availability of an X-ray sensor that is 65 µm or smaller. AS

294

Wu (YV) and Nelsen (TC). **A simple, rapid method to measure wheat hardness by grinding time and speed reduction in a micro hammer-cutter mill.** *Cereal Chemistry* 68(4): 1991: 343-346

Wheat hardness can be simply and quickly measured by determining the time required to collect 17 ml of ground wheat from a 20-g sample in a commercial micro hammer-cutter mill at 3,600 r.p.m. Hard and soft wheats differ in grinding time and in the amount that the machine's speed is

reduced. No correction was necessary for grinding time and speed reduction at moisture levels of 9.3 - 12.7%. AS

295

Thomson (WH) and Pomeranz (Y). **Classification of wheat kernels using three-dimensional image analysis.** *Cereal Chemistry* 68(4): 1991: 357-361

A computer-controlled laser scanning system has been developed to acquire three-dimensional images of the surface of cereal grains. Each picture element represents the elevation of the kernel surface above the reference plane. In addition, a separate image is acquired in which each picture element represents the intensity of the light reflected from the kernel surface. The dual images are then used for feature extraction. The system was used to distinguish between kernels of the wheat cvs Daws (soft white winter) and Tyee (club). A combination of 14 features based on 9 topographic images and 5 intensity images permitted discriminate analysis to correctly classify 92 - 94% of the kernels. The system was also used to identify sprout damage in harvested wheat kernels. A topographical image of the kernel surface helps to distinguish between sprouted and unsprouted kernels. In particular, features that measure the deformation of the germ end of the kernel are crucial to the discrimination process. A discriminant model based on 4 features correctly identified 89% of the sprouted kernels and 83% of the unsprouted kernels when applied to an independent set of test kernels. AS

296

Ercan (R), Erbas (S) and Bildik (E). **Influence of cultivar and location of the thiamin and riboflavin content of bread wheat.** *Getreide-Mehl und Brot* 45(5): 1991: 153-156 (De)

Wheat flour

297

Schnurer (J). **Distribution of fungal biomass among fine bran, coarse bran, and flour from wheat stored at four different moisture levels.** *Cereal Chemistry* 68(4): 1991: 434-437

The fungal content of flour, fine bran, and coarse bran from wheat stored at moisture contents of 12, 16, 20 and 25% was determined as numbers of colony-forming units and as ergosterol levels. The highest values were found when wheat was stored at high moisture contents. In the sound wheat, 97% of the fungal biomass (ergosterol) was found in the bran fraction, which constituted only 31% of the kernel wt. At higher storage moisture, a more even distribution of fungal biomass was found. A weak correlation was found between the number of fungal propagules and ergosterol content. The high concn. of fungal biomass in the bran indicates that a potential mycotoxin hazard is associated with the use of bran to increase the content of dietary fiber in various foods. AS

298

Mettler (E), Seibel (W), Brummer (J-M) and Pfeilsticker (K). **Experimental studies on the effect of emulsifiers and gums in order to optimize the quality of wheat bread. Part 1: The influence of emulsifiers and gums on the rheological properties of wheat flour doughs.** *Getreide-Mehl und Brot* 45(5): 1991: 145-152 (De)

Wheat starch

299

Zhuge (Q), Persaud (JN), Posner (ES), Deyoe (CW), Seib (PA), Chung (DS). **Isolation of gluten and starch from ground, pearled wheat compared to isolation from flour.** *Cereal Chemistry* 68(4): 1991: 336-339

Wheat (16.4% protein) was pearled to remove 11.4% of bran and germ, and the pearled wheat was ground to an average particle size of 200 µm. The ground, pearled wheat (GPW) was compared with conventionally milled flour (70% extraction) as starting material for wet processing. Using the conventional dough-washing method, GPW gave a gluten yield (based on wheat wt.) 20 - 25% higher than that of flour. The gluten from both GPW and flour contained 75.2 - 76.4% protein (dry matter basis) and were the same Agtron colour. Gluten from GPW was only slightly inferior to an equivalent level of gluten from flour in improving loaf colume in breadmaking. No significant difference was noted in the yield and purity of A-starch from GPW and flour. AS

300

Mok (C) and Dick (JW). **Moisture adsorption of damaged wheat starch.** *Cereal Chemistry* 68(4): 1991: 405-409

The moisture adsorption characteristics of wheat starch damaged by ball milling were studied at 30 C, and the adsorption isotherms were analyzed according to the available models. Damaged starch showed lower and higher sorptive capacities than undamaged starch in the regions of low and high water activity, resp. The Chung-Pfost equation was the best-fitting equation for the adsorption data of undamaged starch. As the degree of starch damage increased, the adsorption isotherms deviated more from the Chung-Pfost equation. The Oswin equation was the best-fitting equation for the adsorption isotherm of damaged starch. AS

301

Mok (C) and Dick (JW). **Response of starch of different wheat classes to ball milling.** *Cereal Chemistry* 68(4): 1991; 409-412

Starches isolated from the different wheat classes (durum, hard red spring, hard red winter, soft red winter, and white wheats) with min. damage were ball milled for 0 - 24 h. The response of starch to ball milling for the different wheat classes was investigated to see whether the differences in the sensitivity of starch granules to mechanical action among the wheat classes were also responsible for the different degrees of starch damage with respect to wheat hardness. Upon ball milling, the degree of starch damage showed the following trend with respect to wheat type: durum wheats showed a higher degree of damage than hard wheats, which had more damage than soft wheats. This indicates that the starch in hard wheat is susceptible to the physical action of milling and that the strong starch-protein bonds might contribute to a high degree of starch damage after milling. The degree of swelling and the water-solubility index followed the same trends as the degree of starch damage based on wheat type. AS

MILLETS

302

Lal (S), Srivastava (SK), Joshi (BC) and Prajapati (SK). **Studies on aflatoxin contamination in stored jowar and bajra at farm level.** *Bulletin of Grain Technology* 28(1): 1990; 61-65

Samples of jowar stored in traditional storage structures like bag, kuthla and mataka were assessed for aflatoxins contamination. Samples were collected at every alternate month starting from May 1985 (after 5 months of storage) till September 1985 (9 months of storage). Results showed that jowar was much more contaminated than bajra. Contamination was max. in samples collected after 9 months storage as the moisture content was high due to heavy rains. Samples from bag storage were much more contaminated than kuthla. None of the samples from mataka was found to be contaminated with aflatoxin B_1. Out of the contaminated samples only 7.7% contained 40 p.p.b. of aflatoxin which is more than the prescribed limit of 30 p.p.b. KAR

Corn

303

Rajukkannu (K), Lakshmanan (PL), Doriasamy (P) and Prasad (G). **Aldicarb and carbofuran residues in Deccan maize.** *Madras Agricultural Journal* 77(7-8): 1990; 341-342

The residues of aldicarb and carbofuran were extracted with acetone and transferred to methylene chloride by solvent partitioning. The av. % recovery of aldicarb and carbofuran in maize grain was 91.0 and 94.5 resp. When both carbofuran and aldicarb were applied as basal, residues in grains were not detected at harvest (105 days after treatment). When the same dose (1 kg active ingredient/ha) of carbofuran was applied 15 and 25 days after sowing, the residues in grains were 0.06 and 0.084 p.p.m. resp. GS

304

Macku (C) and Shibamoto (T). **Headspace volatile compounds formed from heated corn oil and corn oil with glycine.** *Journal of Agricultural and Food Chemistry* 39(7): 1991; 1265-1269

The volatile compounds formed in headspace from heated corn oil alone or from corn oil with glycine were collected by a simultaneous purging and solvent extraction apparatus. Aroma components were isolated and identified by GC and GC/MS. Among 123 GC peaks recorded from the samples, 71 compounds were positively identified: 18 aldehydes, 15 heterocyclic compounds, 13 hydrocarbons, 11 ketones, 4 alcohols, 3 esters, and 7 miscellaneous compounds. Total amounts of aldehydes formed in the headspace, particularly unsaturated aldehydes, decreased drastically with the addition of glycine. On the other hand, the number of volatiles formed from corn oil with glycine was significantly greater than from corn oil alone, suggesting that aldehydes formed from corn oil underwent secondary reactions with glycine. AS

Corn flour

305

Minka (S), Laurent (G), Bruneteau (M), Pivot (V) and Michel (G). **Isolation and composition of glycolipids from corn flour.** *Food Chemistry* 39(3): 1991; 329-338

Total lipids extracted according to De Stefanis and Ponte from corn flour (from Cameroon, var. white) amounted to 0.5% of the dry flour wt. The total lipids consisted of 90% neutral lipids, 5% glycolipids and 3% phospholipids. The glycolipids contained glucolipids as major components (4.5%) and minor amounts of a glycerolipidic fraction (0.6%). Glycolipid fatty acids were identified as linoleic, oleic and palmitic acids. AS

Finger millets

306

Vanangamudi (K), Selvaraj (KV) and Kulandaivelu (R). **Influence of irrigation on the seed yield and quality of finger millet.** *Seed Science and Technology* 18(2): 1990: 283-286

In finger millet cv 'CO.12', irrigation was scheduled when the cumulative pan evaporation reached 56, 67 and 83 mm which was equivalent to intervals of 8 - 9, 10 - 11 and 12 - 13 days resp. Irrigating the field when cumulative pan evaporation reached 56 and 67 mm induced early flowering and maturity and resulted in a higher seed yield, improved quality and storability of seeds. The fungal load in storage was also low. By comparison, irrigating when cumulative pan evaporation reached 83 mm reduced the yield (24%), the quality and the storability of the seed which had a heavy fungal load. AS

Pearl millets

307

Khetarpaul (N) and Chauhan (BM). **Effect of pure sequential culture fermentation by yeasts and lactobacilli on HCl-extractability of minerals from pearl millet.** *Food Chemistry* 39(3): 1991: 347-355

Sequential culture fermentation of pearl millet flour first by yeasts (*Saccharomyces diastaticus, Sacchoromyces cerevisiae*) at 30 C for 72 h and secondly by lactobacilli (*Lactobacillus brevis; Lactobacillus fermentum*) at 30 C for 72 h brought about a significant increase in inorganic, HCl-extractable and non-phytate phosphorus with a corresponding decline in phytate phosphorus. The HCl-extractabilities of Ca, Fe, Zn, Cu and Mn from the fermented millet flour were also improved. Higher HCl-extractability of the minerals may be partly ascribed to the decreased content of phytic acid as a significant negative correlation between the phytic acid and HCl-extractability of dietary essential minerals was obtained. AS

Sorghum

308

Hassan Shazali (ME) and Smith (RH). **The growth of single and mixed laboratory populations of three insect pests on stored sorghum.** *Bulletin of Grain Technology* 28(2): 1990: 107-115

The growth of single and mixed populations of *sitotroga cerealella*, (anugumois grain moth), *Sitophilus oryzae* (rice weevil) and *Tribolium castaneum* (red flour beetle) were studied at 30 C and 70% RH in the lab. on Sundanese sorghum var. (Um benein 22). In single sp. cultures, the population growth of *S. cerealella* was greater than *Sit. oryzae* and *Tr. castaneum*. The former multiplied exponentially reached a lower max. and then declined sharply. *Tr. castaneum* failed to build comparable populations. In mixed sp. culture, *S. cerealella* eliminated *Sit. oryzae*, whose reproductive capacity was so much reduced that it was unable to reproduce progeny to maintain a significant level of interference: *S. cerealella* was eliminated by *Tr. castaneum* which besides reducing the moth numbers, due to its predatory habits was able to multiply to such an extent as a result *S. cerealella* became extinct. KAR

309

Agrawal (JP), Srivastava (JL), Ashok Kumar and Sone Lal. **Studies on the storability of jowar and bajra in different storage containers.** *Bulletin of Grain Technology* 28(2): 1990: 128-132

Storability of jowar (*Sorghum vulgare*) and bajra (*Pennisetum typhoideum*) and their milled products (atta) was studied in jute bags, polythene bags and tin canisters, under lab. conditions for 7 months. The initial moisture content of 12.8% of whole jowar after 7 months reduced to 13.0, 12.8 and 12.6% in jute bag, polythene bag and in canister resp. while in atta it was 13.2%. The initial moisture content of 12.6% of bajra reduced to 13.7, 12.7 and 12.5% in jute bags, polyethylene bags and canister resp. while in atta it was 13.1%. The tests conducted included alcoholic acidity, free fat acidity, total ash, acid insoluble ash, and sensory quality like taste and flavour. It was inferred that development of rancidity was least in whole jowar and bajra stored in jute bags and max. in those stored in polythene bags. Rancidity development was more in their respective flavours as compared to whole grains, thus whole jowar and bajra may be stored in jute bags for about 7 months under normal conditions. KAR

310

Vangamudi (K), Kulandaivelu (R) and Selvaraj (KV). **Effect of irrigation on seed yield and quality of sorghum.** *Seed Science and Technology* 18(2): 1990: 255-258

An experiment was conducted with sorghum (*Sorghum bicolor* (L.) Monech) cv 'CO.25' to elucidate information on the yield and quality of seeds in relation to irrigation water supplies. Irrigation was scheduled when the cumulative pan evaporation reached 67, 83 and 111 mm equivalent to irrigation frequencies of 10 - 11, 12 - 13 and 14 - 15 days resp. The more frequent irrigations hastened the maturity

of the seed crop and resulted in higher seed yield. Quality and storability were better in the seeds obtained from plots given more frequent irrigation, the seeds were less susceptible to attack by storage fungi. AS

311

Lasekan (OO). **A preliminary study of the comparative malting qualities of *Sorghum bicolor* and *Sorghum guineensis*.** *Food Chemistry* 39(3): 1991: 241-247

Malting qualities of *Sorghum bicolor* and *Sorghum guineensis* grown in the same field were studied. After the different sorghum grains were steeped in water (30 plus or minus 2 C) with a six-hourly steep liquor change schedule, they were grown on a glass sheet lined with moist blotting paper for a period of 6 days. Germinated seedlings were kilned to a moisture content of 4%. Samples of sorghum (*S. bicolor* and *S. guineensis*) were collected at three different stages (steeping, germination and malt) and subjected to analysis of sugar content, diastatic activity, protein content, viability, apparent extract, water extract and sedimentation rate. *S. bicolor*, which exhibited a significantly ($P < 0.05$) high moisture content when compared with *S. guineensis*, also had a significantly ($P < 0.05$) high protein content, malting loss, enzyme activity and acrospire length. However, no significant ($P < 0.05$) difference was observed when the different sorghums were analysed for sugar and diastatic activity. Variations in sedimentation rates, moisture contents, protein contents, apparent extracts and cold and hot water extracts of the sorghum malts are discussed. AS

312

Westby (A) and Gallat (S). **The effect of fermentation on the viscosity of sorghum porridges.** *Tropical Science* 31(2): 1991: 131-139

This work was carried out as part of the study to assess the potential of fermented sorghum porridges for use as weaning foods. Changes in viscosity, pH value, total titratable acidity, and microbial numbers during fermentation were measured. Lactic fermentation had no marked effect in reducing porridge viscosity, but did produce a pleasant smelling porridge with a low pH value. Microorganisms other than lactic acid bacteria and yeasts were inhibited. Microbiological thinning of sorghum porridges is attainable, but in this study was only achieved through a *Bacillus* spp fermentation. The resultant porridge had an unpleasant odour. AS

PULSES

313

Chamma (HMCP), Marcos-Filho (J) and Crocomo (OJ). **Maturation of seeds of 'aroana' beans (*Phaseolus vulgaris* L.) and its influence on the storage potential.** *Seed Science and Technology* 18(2): 1990: 371-382

Seeds of 'Aroana' beans (*Phaseolus vulgaris* L.) were harvested at different periods, ranging from 29 to 63 days after the beginning of flowering. Moisture content, dry matter wt, germination, vigour, seed colour and the contents of total carbohydrates, reducing sugars, protein, soluble N and amino acids were determined. Germination and vigour tests were carried out after the seed had been stored for up to 6 months in order to study the performance of the seeds. It was found that seed dry matter wt. was insufficient by itself to characterise physiological maturity; pod colour may constitute a useful parameter for identifying seed maturity. AS

314

Neumayr (L) and Kramer (J). **Production of enterotoxin A thermonuclease by *Staphylococcus aureus* in legumes.** *International Journal of Food Microbiology* 10(3/4): 1990: 225-234

Growth, enterotoxin A (SEA) and thermonuclease (TNase) production of *S. aureus* (Strains CP 7 and FRI 722) was determined in media produced from the following heat or irradiation sterilized legumes: peas, black beans, mung beans, adzuki beans and soybeans. Media containing the five legumes alone or in combination with Brain Heart Infusion Broth (BHI) were tested. With the exception of heat-sterilized black beans and adzuki beans, *S. aureus* growth was excellent in all media with cell counts after 48 h (25 C) exceeding 10^8 cfu/ml. In black beans and adzuki beans cell counts were 1-2 log-cycles lower. Enterotoxin A was produced in amounts of 33 to 72 ng/ml in BHI after 48 h. Almost no toxin was produced in the 4 different beans following heat or irradiation treatment; in peas the toxin concn. reached 14 to 15 ng/ml. In the medium prepared from irradiated soybeans and BHI the final toxin concn. was about the same as in BHI alone. In all the other media consisting of a combination of legumes with BHI toxin concn. were three to four times higher than in BHI alone. Production of thermonuclease showed variation and did not always correlate with enterotoxin production. AS

315

Marquez (UML) and Lajolo (FM). ***In vivo* digestibility of bean (*Phaseolus vulgaris* L.) proteins: The role of endogenous protein.** *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1211-1215

The effects of ingestion of diets containing cooked whole beans, albumins, or globulins on the fecal N and S origin were evaluated in rats by employing ^{15}N- and ^{35}S-labeled beans. The ingestion of whole beans caused the highest N and S excretion, mostly originated from exogenous sources. Whole beans and, to a lesser extent, albumins also increased metabolic fecal N excretion which represents approx. 20% of total N elimination. Isolated cooked bean globulins are well digested, having no effect on metabolic protein output. This suggested that other, nonprotein components present in whole beans may be involved in the increase of both exogenous and endogenous fecal protein. AS

316

Morrow (B). **The rebirth of legumes.** *Food Technology* 45(9): 1991: 96, 121

Legume production, consumption, export and the increasing awareness among the people about the nutritional benefits of legumes such as its high content in complex carbohydrates, protein and dietary fiber, especially water-soluble fiber which lowers the cholesterol in the blood are discussed in this article. CSA

317

Nielsen (SS). **Digestibility of legume proteins.** *Food Technology* 45(9): 1991: 112-114, 118

The article focusses on the factors that limit the legume protein digestibility of the common bean, *Phaseolus vulgaris*, the digestibility of protein fractions of dry bean as compared to other legumes, the degradation of phaseolin, the major storage protein of *P. vulgaris* and the comparative digestibility and the digestibility relationship of phaseolin in relation to other legume proteins. CSA

318

Lajolo (FM), Filho (FF) and Menezes (EW). **Amylase inhibitors in *Phaseolus vulgaris* beans.** *Food Technology* 45(9): 1991: 119-121

This article describes the occurrence, characteristics, kinetics and binding mechanism and the biological activity of α-amylase inhibitors which occur in common beans (*Phaseolus vulgaris*). CSA

Chickpea

Chickpea flour

319

Hussain (A) and Bushuk (W). **Detection of pea flour in flour of chickpea by lactate polyacrylamide gel electrophoresis.** *Journal of Food Quality* 12(6): 1989: 427-432

Polyacrylamide gel electrophoresis was applied to detect adulteration of chickpea flour with pea flour by the presence of extra bands in the unique electrophoregram of chickpea. Protein extracts prepared by a single extraction with 5M acetic acid produced patterns which were used to differentiate pea and chickpea samples. Using the described procedure, 10 var. of chickpea did not show intervarietal variation in their electrophoregrams, wheareas 11 var. of pea showed intervarietal differences in their protein comp. However, six of the 25-30 protein bands present in electrophoregrams of most pea var. can be used as markers for detection of pea flour in chickpea flour. Band 37, present both in chickpea and pea samples, can be used as an internal reference for inter gel comparisons. AS

Cowpeas

320

Jindal (KK) and Thind (BS). **Microflora of cowpea seeds and its significance in the biological control of seedborne infection of *Xanthomonas campestris* pv. vignicola.** *Seed Science and Technology* 18(2): 1990: 393-403

External and internal microflora of normal, shrivelled and discoloured cowpea seeds (cv 'Pusa Barsati' and 'Pusa Dofasli') were studied using a seed washing technique. Of 5 species of bacteria and 17 species of fungi associated with the seed the following were most common: *Acinetobacter calcoaceticus*, *Erwinia herbicola*, *Pseudomonas acidovorans*, *Fusarium semitectum*, *Penicillium oxalicum* and *Trichothecium roseum*. In general, the seeds harboured a significantly higher population of bacteria than fungi. Discoloured seeds yielded the highest microbial populations. The total population of microorganisms isolated from internal tissues was significantly higher than that isolated from seed surfaces. A greater number of microorganisms was isolated from seeds of cv. 'Pusa Barsati' than from seeds of cv 'Pusa Dofasli'. *A. calcoaceticus*, *F. semitectum*, *T roseum* and *P. oxalicum* were found to be associated mostly with discoloured seeds whereas *P. acidovorans* and *F. semitectum* were associated mostly with shrivelled seeds. Soaking or rolling cowpea seeds in cell suspensions of *A. calcoaceticus*, *P. acidovorans* and spore suspensions of *Aspergillus flavus*, *F. equiseti*, *F. semitectum*, *Rhizopus oryzae* and *T. roseum* resulted in significant reduction in seed germination. *A. calcoaceticus*, *Bacillus subtilis*, *Flavobacterium sp.*, *P. acidovorans*, *A. flavus*, *Epicocum nigrum*, *F.*

equiseti, *P. citrinum*, *P. oxalicum*, *R. oryzae* and *T. roseum* were inhibitory to *Xanthomonas campestris* pv. *vignicola* *in vitro*. Several organisms including *E. herbicola* and *P. oxalicum* were as effective as hot water (50 C for 30 min), solar heat, Streptocycline (100 µg/ml) + Captan (0.2%) and Streptocycline (100 µg/ml) + Agallol (0.2%) for the eradication of *X. campestris* pv. *Vignicola* from cowpea seeds. AS

321

Tuan (Y-H) and Phillips (RD). **Effect of the hard-to-cook defect and processing on protein and starch digestibility of cowpeas.** *Cereal Chemistry* 68(4): 1991: 413-418

Cowpeas were stored for 6 wks at 37 C for 85% r.h. for a test group and at 7 C for 60% r.h. for a control group. After storage, they were treated as follows: cooked for 45 min; cooked for 90 min; ground into a flour; made into a flour slurry (20% solid) and cooked as a gruel for 45 min; or ground into flour and extruded at 20% moisture with a barrel temp. of 150 C. The hard-to-cook defect was observed in the test group. The effect of storage conditions and processing treatments on the nutritional quality of cowpea protein and starch was determined by *in vitro* and *in vivo* (fecal and ileal digestibility) methods. The *in vitro* and ileal methods indicated that the protein digestibility of the control group was significantly higher than that of the test (hard-to-cook) group (78.5 vs. 75.3% and 76.9 vs. 66.6%, resp.); the fecal assay detected no difference. *In vitro* and ileal protein digestibility was highest in cowpeas cooked for 45 min (80.3 and 81.8% resp.) and lowest in cowpeas ground into flour (72.6 and 65.4%, resp.). Grinding before processing exacerbated the differences between the control and the test groups. Starch digestibility was enhanced by grinding before cooking but showed little response to storage conditions. AS

322

Echendu (TNC). **Ginger, cashew and neem as surface protectants of cowpeas against infestation and damage by *Callosobruchus maculatus* (Fab.).** *Tropical Science* 31(2): 1991: 209-211

Surface application of cashew nut (*Anacardium occidentale*) shell liquid was found to be superior to ginger (*Zingiber officinale*) and neem (*Azadirachta indica*) in reducing cowpea infestation by *Callosobruchus maculatus*. The results of the viability test also revealed no adverse effects on seed viability as a result of any of the treatments. BV

323

Phillips (RD) and McWatters (KH). **Contribution of cowpeas to nutrition and health.** *Food Technology* 45(9): 1991: 127-130

This article reviews the research conducted on cowpea an important source of protein and B-vitamins in Nigeria, its importance in Nigerian nutrition and the constraints to cowpea consumption. The article also describes the flour production technology for producing ready-to-use cowpea flour, its nutritional and physiological aspects, microbiological aspects, functional aspects and the implementation of the technology in village mills and US market. CSA

Cowpea pastes

324

McWatters (KH), Hitchcock (HL) and Resurreccion (AVA). **Effect of frozen storage on the quality of akara, fried cowpea (*Vigna unguiculata*) paste.** *Journal of Food Quality* 14(2): 1991: 165-174

Akara, a fried food made from whipped cowpea paste flavoured with onion, fresh hot/bell pepper and salt, stored at -18 C for 9 months showed significant difference in moisture, crude fat, shear, colour, hue angle, chroma and sensory colour, moistness, tenderness and flavour compared to the fresh sample. Two out of fifteen peaks were also significantly affected as revealed in headspace volatile analysis. SD

Dry beans

325

Hosfield (GL). **Genetic control of production and food quality factors in dry bean.** *Food Technology* 45(9): 1991: 98, 100-103

This article presents the background of common bean (*Phaseolus vulgaris*) its method of pollination, consumer preferences, production, export and consumption, plant breeding and early humans, exploitation of variability, plant breeding as an art and science. The nature of variability for traits in dry beans due to genetic causes, environmental causes, and heritability, the opportunities offered to genetically improve beans such as production factors, food quality, nutritional quality and culinary quality and the strategies for improvement are discussed. CSA

326

Uebersax (MA), Ruengsakulrach (S) and Occena (LG). **Strategies and procedures for processing dry beans.** *Food Technology* 45(9): 1991: 104-108, 110-111

This article presents an overview of diverse strategies and procedures such as constraints limiting dry bean utilization, postharvest handling and preparation, direct thermal preparation (cooking and canning), precooked prepared products (quick-cooking beans, frozen/dehydrated beans, extruded products and microwavable products), novel products and ingredients (bean meals, flours and powders: sprouts, curds and ferments), potential in nutrition and health (hypocholesterolemic effect, hypoglycemic effect and weaning foods) and research needs which could help to increase dry bean utilization. CSA

327

Hughes (JS). **Potential contribution of dry bean dietary fiber to health.** *Food Technology* 45(9): 1991: 122, 124-126

This article covers classification of dietary fiber (soluble and insoluble, structural and non-structural), role in reducing disease (coronary heart disease, diabetes and colon cancer) risk, physiological effects and mechanisms (serum cholesterol and coronary heart disease, glucose tolerance and colon cancer) and advantages. CSA

Green gram

328

Doharey (RB), Katiyar (RN) and Singh (KM). **Eco-toxicological studies on pulse beetles infesting green gram. IV. Comparative efficacy of some edible oils for the protection of green gram (*Vigna radiata* (L.) Wilczek against pulse beetles, *Ca.llosobruchus chinensis* (L.) and *Callosobruchus maculatus* (F).** *Bulletin of Grain Technology* 28(2): 1990: 116-119

Oils of groundnut, mustard, rice bran, safflower, sesame, sunflower and taramira (*Eruca sativa*) were used at 0.10, 0.25, 0.50 and 1.0% concn. (w/w) to control *Callosobruchus chinensis* and *Callosobruchus maculatus* in green gram. Malathion 50% E.C. was used at 0.001% (10 p.p.m.) level. Coconut, groundnut and mustard oils at 1.0% (w/w) concn. controlled the pests effectively than the other oils upto 6 months after treatment. All the edible oils were more effectively controlled the pests than malathion. Sunflower oil at all the concn. against *C. chinensis* and safflower oil against *C. maculatus* were found less effective after 6 months of treatment. KAR

Mungbeans

329

Raghuvanshi (RS), Bhattacharya (L) and Singh (DP). **A study on the chemical composition and protein fractions of improved varieties of mungbean (*Vigna radiata* L. Wilczek).** *Bulletin of Grain Technology* 28(1): 1990: 18-21

The improved var. studied are Pant M-8, Pusa Baisakhi, S-9, T-1 and T-44. Crude protein content ranged from 23.33 to 26.98%, crude fibre from 3.61 to 4.91% and crude fat from 1.16 to 1.37%. Based on Mahalanobis D^2 statistics the test var. were clustered in which cluster A comprised of T-1 and T-44, cluster B, C and D comprised of S-9, Pusa Baisakhi and Pant M-8. Albumin fraction ranged from 62.11 to 66.59%, globulin from 18.64 to 26.57%, prolamin from 0.55 to 0.76% and residual protein from 8.89 to 16.25%, of the total protein. KAR

OILSEEDS AND NUTS

Cashewnuts

330

Vijay Singh. **Studies on chemical composition of varieties of cashewnut kernels, *Anacardium occidentale* (L.) for susceptibility to *Corcyra cephalonica* (Staint), *Tribolium castaneum* (Hbst) and *Oryzaephilus surinamensis* (L.).** *Bulletin of Grain Technology* 28(1): 1990: 4-8

Chemical comp. of three var. (Tree No. 1, Tree No. 39 and Tree No. 56) of cashewnut kernels, was studied to find out the differences if any, in their chem. comp. and how it related to their susceptibility to infestation by *C. cephalonica*, *T. castaneum* and *O. surinamensis*. It was found that least susceptible var. was characterized by low content of total N (5%), crude protein (15.55%), ash (2.5%) and Cu (0.05 p.p.m.) and high content of fat (47.8%), albumin (11.20%), globulin (8.24%), total sugars (39.9%) and reducing sugars (3.2%). The least susceptible var. *C. cephalonica* and *O. surinamensis* L. was for Tree No. 39. The least susceptible var. (Tree No. 39) also contained low fat free portion (47.8%), glutelin (7.8%), and Zn (0.53 p.p.m.). Tree No. 1 which is most susceptible also contained high Ca (90 p.p.m.), K (68 p.p.m.) and Fe (1.5 p.p.m.). Moisture content did not show any relationship to susceptibility of the var. KAR

Cottonseed flour

331

Camire (ME), King (CC) and Bittner (DR). **Characteristics of extruded mixtures of cornmeal and glandless cottonseed flour.** *Cereal Chemistry* 68(4): 1991; 419-424

The effect of protein and dietary fiber supplementation on physical, chemical and sensory quality properties were evaluated by extrusion cooking of mixtures of cornmeal and glandless cottonseed flour. Response surface analysis was used to determine the effect of the level of cottonseed flour (0 -25%, w/w), barrel temp. (65.6 - 93.3 C), screw speed (350 - 450 r.p.m.), and moisture content (18 - 21%) on the characteristics of the dried extrudates. Increased levels of cottonseed flour reduced collet bulk density and resistance to shear and increased diametric expansion and darkness compared with cornmeal controls that were similarly processed. Extrusion reduced protein solubility and available lysine in samples. Water absorption capacity was dependent largely on the moisture content of the mixture. A sensory panel found the samples containing cottonseed flour to be less yellow, softer and processing a nutty flavour. Snacks containing 12.5% cottonseed flour were as acceptable overall as those containing only corn. Products containing higher levels of cottonseed flour may require seasoning to improve palatbility. AS

Groundnuts

332

Singh (U), Singh (B) and Smith (OD). **Effect of varieties and processing methods on phytic acid and protein digestibility of groundnut (*Arachis hypogaea* L.).** *Journal of Food Science and Technology (India)* 28(6): 1991: 345-347

Processed groundnuts (cv 'Florunner', 'US No. 1') by boiling, water- and steam- blanching and roasting, and other var. (viz. 'TP 171-2', 'TP 172-2', 'TP 175-3', 'TP 175-6', 'TP 178-1', 'TP 18-3', 'TX AG-3' and 'RMP-12') were analyzed for protein, phytic acid, total P, N solubility and *in vitro* protein digestibility (IVPD). Phytic acid of 9 var. varied from 2.89 to 3.96 mg/g indicating significant differences among var. The IVPD values of these var. ranged from 66.8 to 77.5% with mean being 70.9%. There was a significant negative correlation between phytic acid and IVPD of these var. Removal of seed coat in the present study did not reveal noticeable differences in phytic acid, whereas it considerably influenced N solubility and IVPD values. Processing methods reduced the phytic acid of groundnut and effect was more pronounced in boiling process (wet-heating) followed by blanching processes. Dry-heating (roasting) considerably reduced IVPD of groundnut, whereas it did not show any noticeable effect on phytic acid. AS

Linseeds

333

Vasishtha (AK), Bajpai (M), Pandey (S) and Rai (M). **Studies of the seed characteristics and composition of the oils in linum: New Pusa (NP) varieties.** *Journal of the Oil Technologists Association of India* 22(1): 1990; 9-19

One hundred and seventy New Pusa (NP) var. of linseed were analysed for oil, protein content, iodine value and fatty acid comp. after grouping them into NP-regular var., NP-rust resistant var., and NP-hybrid var. In NP-regular var. the oil content ranged between 28.5 and 45.1%, protein content from 12.9 to 23.3%, iodine values were 16.3 to 194.5, palmitic acid content was from 5.3 to 8% and stearic acid from 3.1 to 7.4%. The linolenic acid content was 41.3 to 61.3%. In NP-rust resistant var. the oil content ranged from 30 to 46.9%, protein from 14.1 to 21.6%, sp. gr. 0.914 and 0.928, iodine values showed wide variations, palmitic acid varied between 5 and 8% and stearic acid content ranged 3.2 to 7.8%, highest amount of oleic acid was 30.7% and lowest being 15.6%, the linoleic acid content ranged between 9.8 and 26.4% and linoleic acid content varied widely. In NP-hybrid var. one var. (NP-hyb-603-2(R)) contained > 46% oil and others had 40% oil content. The protein content was 13.7 to 20.4%. Variations in sp. gr. and saponification values were minor. Palmitic acid content ranged between 5.5 and 7.9%, and stearic acid between 3.3 and 7.3%. Oleic acid content varied from 16 to 29%. The linoleic acid content varied from 10.5 to 18.9% and linolenic acid from 45.8 to 58.3%. SRA

Niger

334

Nagaraj (G). **Fatty acid and amino acid composition of niger varieties.** *Journal of the Oil Technologists Association of India* 22(4): 1990; 88-89

Niger oil from 5 major var. (No. 71, Ootacomund, N5, RCR 18, IGP 76) were analysed. Oil content was highest in No. 71 (39.4%) followed by RCR 18 (37.2%); other three var. contained 30.9 to 33.4% oil. The refractive index of the oil was around 1.4715 and the oils had bright yellow colour (mean value 2.9 Y + 0.5 R). Oleic and linoleic acids were the main fatty acids (85%) No 71 and IGP 76 contained aroung 58% of linoleic acid and around 25% oleic acid. Ootacamund and N5 var. had higher level of oleic

acid (29%) and lower level of linoleic acid (52%). The crude protein content of the deboiled cake was higher in Ootacamund var. (43.44%) followed by No. 71 (40.25%). The other three var. had protein content of 37 - 39%. Methionine content was higher in No. 71, RCR 18 (2.3%) while cystine was higher in Ootacamund (2.4%). The total lysine content of the var. was 3 - 3.7%. Glutamine was the major amino acid (19%) followed by a rginine (8%) aspartic acid (8%), and leucine (6%). Niger proteins is deficient in leucine and lysine. Based on the fatty acid and amino acid comp. No. 71 followed by Ootacamund var. appear to be better than the other 3 var. SRA

Soybeans

335

de la Barca (AMC), Vazquez-Moreno (L) and Robles-Burgueno (MR). **Active soybean lectin in foods: Isolation and quantitation.** *Food Chemistry* 39(3); 1991: 321-327

An improved method was developed to determine active soybean lectin in processed foods containing soybean. Freeze drying of crude extracts followed by affinity chromatography allowed to purify and quantitate active lectin. After dialysis, concentrated extracts from products were loaded on to a chromatography column of immobilized N-acetyl-galactosamine. Active lectin content of soy flours depended on the processing method used. The highest level found was for raw seeds (3600 µg/g), and the lowest for texturized flour (12.9 µg/g). Direct human consumption foods contained various lectin concn. While meat substitutes were free of active lectin, milk substitutes, and bakery products had low levels. A cereal type food and a cookie showed the highest lectin concn. (187.2 and 24.2 µg/g, resp.). AS

Soy products

Soy milk

336

Maity (TK) and Paul (SC). **Low-oligosaccharide soy milk: Application of** α-galactosidase for hydrolysing soy-oligosaccharide. *Indian Dairyman* 43(10); 1991; 443-448

Presence of oligosaccharides in soy milk cause flatulence in human system due to the shortage of α-galactosidase in human system. This paper reviews the work so far accomplished to hydrolyse oligosaccharides in soy milk thereby making it more suitable for human consumption. The aspects covered include the various sources of α-galactosidase, its preparation especially from fungi, assay methods and its properties. Methodology involved in the preparation of soy milk, and the method of effecting the hydrolysis and the prospects of oligosaccharide hydrolysed soy milk have also been described briefly. SRA

Tempe

337

Matsumoto (I) and Imai (S). **Processing of soybeans for manufacture of *tempe*.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990: 497-504

Processing of soybeans for industrial manufacturing of *Tempe*, a traditional fermented soybean food in Indonesia, was investigated. The bacterial count of *Tempe* prepared from peeled soybeans was lower by 2 orders than those prepared from unpeeled soybeans. The bacterial count of *Tempe* was lowered by soaking peeled soybeans in an aqueous solution of an organic acid. Acetic acid gave the most effective results among organic acids employed. Namely, 0.2% level of acetic acid, 1.0% level of lactic acid, succinic acid and tartaric acid, or 3.0% level of citric acid was required in order to lower the bacterial count of *Tempe* to 10^4/g level. It was appropriate to soak peeled soybeans in an aqueous solution of acetic acid at 17 to 20 C for 3 to 4 h. *Tempe* prepared from peeled and pressure-steamed soybeans was superior in taste to the one prepared from boiled soybeans. Steaming the peeled and soaked soybeans under 0.8 kg/cm ^{2} for 3 to 7 min made the hardness of the soybeans to 1.0 to 1.5 kg which gave appropriate condition to make *Tempe*. Satisfactory *Tempe* manufacturing may include the following process: peeling soybeans; soaking the peeled soybeans in 0.2% solution of acetic acid for 3 to 4 h; draining the beans; and steaming under 0.8 kg/cm ^{2} for 3 to 7 min. AS

TUBERS AND VEGETABLES

Onions

338

Sharma (PK) and Nirankar Nath. **Dehydration characteristics of ten onion cultivars.** *Journal of Food Science and Technology (India)* 28(6): 1991: 348-351

Onion var. were dehydrated as 5 mm thick rings in an air cabinet drier (65 plus or minus 2 C, 7 h). Dehydration reduced pungency (as pyruvic acid) and ascorbic acid levels, and induced browning; the extent of these changes depended upon var. Colour

of dehydrated product showed significant positive correlation with flesh colour but not the peel colour. Var. were ranked on the basis of quality of their dehydrated rings. 'VL-1' was found to be excellent, 'Pusa Red' was very good, and 'Punjab Red' and 'Sel-102-1' were good for dehydration. AS

Root vegetables

339

Aneez Ahamad (PY) and Ahmed (SM). **Potential of some rhizomes of Zingiberaceae family as grain protectants against storage insect pests.** *Journal of Food Science and Technology (India)* 28(6): 1991: 375-377

The comparative efficacy of indigenous plant species viz. *Alpinia galanga* Willd., *Curcuma amada* Roxb., *Curcuma longa* L.; *Curcuma zedoaria* Rose. and *Zingiber officinale* Rose. all belonging to the family Zingiberaceae was evaluated against *Sitophilus oryzae* (L.) and *Corcyra cephalonica* (Staint.) infesting wheat *Triticum aestivum* Lam. All the powdered rhizomes tested were found significantly superior to control in protecting the grain at the concn. of 1 and 3% W/W in bringing about higher mortality of *S. oryzae* adults. The insect mortality was cent per cent in the treatments even at 1% level after 45 days. Besides, the treatments *C. amada* and *C. longa* were highly significantly effective in inhibiting the emergence of F_1 generation of the weevil followed by *A. galanga*, *C. zedoaria* and *Z. officinale*. While against *C. cephalonica* larvae, the treatment *A. galanga* was the best grain protectant even at 1% level after a period of 15 and 30 days. However, at 3% level there was no significant difference between *A. galanga*, *C. longa* and *Z. officinale* and they were superior in causing high larval mortality followed by *C. zedoaria* and *C. amada*. AS

Carrots

340

Premavalli (KS) and Arya (SS). **Effect of vegetable oils on the stability of carotenoids in carrot halwa.** *Indian Food Packer* 45(4): 1991: 22-28

Carrot halwa (a sweet meat) was prepared using safflower oil, coconut oil, palm oil and oil hydro each separately. Halwa was packed in polypropylene (60 μ) pouches (15 cm x 15 cm) and stored at 37 plus or minus 1 C. Carotenoids were more stable in carrot halwa with safflower oil (45.3%) than palm oil (41.1%), coconut oil (24.3%) and oil hydro (19.6%) after 3 months storage. But in lipophylic system of oils and hydrophylic system when coated on cellulose and exposure to various a_w, β-carotene was more stable with coconut oil than with safflower oil. In hydrophylic system, β-carotene (40 mg) dissolved in benzene and coconut oil/safflower oil (500 mg) were coated in microcrystalline cellulose (40 g). Similarly β-carotene and oils were coated on sugar, starch, pectin and carboxymethyl cellulose. On microcrystalline cellulose and carboxymethyl cellulose, coconut oil exerted better protection, safflower oil exhibited protective effect on sugar and pectin and there was no specific action on starch. The changes among adsorbents and interaction of oil-adsorbents were significant $P = 05$. In the presence of safflower oil, the regression coeff. of loss of β-carotene against storage period remained same both on sugar (67.7 μg) and on cellulose (68.8 μg) whereas in coconut oil the rate of degradation was more on sugar (95.1) than on cellulose (49.4). Sugar with safflower oil may cause better stability of carotenoids in halwa. VKR

341

Premavalli (KS), Vidyasagar (K) and Arya (SS). **Storage behaviour of vegetable halwas.** *Indian Food Packer* 45(4): 1991: 29-34

Halwa from carrot (*Daucus carota*) and pumpkin (*Cucurbita maxima*) was prepared and cooked as such or after adding potassium sorbate (0.134%, 6.7 g in 25 ml water) to a final Brix of 68 ^{0}. They were packed separately in polypropylene (60 μ) (PP) and paper (60 GSM) - aluminium foil (40 μ) polyethylene (40 μ) (PFP) laminate pouches. They were stored at 37 plus or minus 1 C and at 15 - 35 C (room temp.). Treated carrot and pumpkin halwa remained stable upto one and two months in PP pouches and three and six months in PFP pouches resp. Changes in carotenoids, non-enzymatic browning during storage followed the same pattern in both the treatments. The loss of potassium sorbate in halwas was 4 - 15% in PP pouches and 0 - 6% in PFP. The changes in all the parameters in general were more predominant in PP pack than PFP pouches. It is concluded that the incorporation of potassium sorbate may be preferred than that of cooking as it will save energy consumption in processing. After 6 months of storage carotenoid retention was 52 and 69% in PP pouches as compared to 65 and 79.6% in PFP pouches in heat treated and sorbate treated samples resp. Considering the relative rates of carotenoid degradation, non-enzymatic browning, sorbate action and acceptance of the product, carrot halwa has a shelf-life of one month in PP and 3 months in PFP pouches and pumpkin halwa has a shelf-life of 2 months in PP and 6 months in PFP pouches. VKR

342

Phillips (KM) and Palmer (JK). **Effect of freeze-drying and heating during analysis on**

dietary fiber in cooked and raw carrots. *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1216-1221

Soluble and insoluble dietary fiber contents in raw and cooked carrots were measured by a modified Association of Official Analytical Chemists (AOAC) enzymatic-gravimetric procedure. Analyses were done on cooked and raw carrots, with and without freeze-drying and with and without heating during analysis. Heating for 1.25 h at 121 C caused a 3 - 5 fold increase in soluble fiber and a comparable decrease in insoluble fiber, suggesting a conversion of the latter to the former. Cooked carrots generally had more (3 - 9 g/100 g) soluble fiber than the raw product, but when samples were both freeze-dried and analyzed with gelatinization, soluble fiber was equivalent (ca. 10 g/100 g). Hence, since standard dietary fiber methods generally include freeze-drying and gelatinization, differences in the amount of fiber in cooked and raw foods may be obscured. Sugar and uronic acid analyses on soluble fiber fractions suggested that cooking and/or gelatinization resulted in increased solubilization of pectin (polygalacturonan) and arabinogalactan. Results of the present study indicate that current dietary fiber values may not accurately represent the level of this component in some foods as they are eaten. AS

343

Marques (JPM), Rutledge (DN) and Ducauze (CJ). **Low resolution pulse nuclear magentic resonance study of water equilibration in dried carrots.** *International Journal of Food Science and Technology* 26(2): 1991: 173-183

Samples taken during air drying of carrots were analysed after different equilibration times. Low resolution NMR measurements were made and the longitudinal (T_1) and the transverse (T_2) relaxation times calculated. Both T_1 and T_2 decreased with the equilibration time for water contents above 0.30 and 0.47 kg water kg $^{-1}$ dry matter, resp. The decrease in relaxation time increased with the water content. For the same water contents, grated carrots gave lower T_1 values and smaller T_1 decreases with equilibration time than 3-mm cubes. Low resolution NMR is a technique which is well suited to the monitoring of the tempering phases of industrial drying cycles. AS

Cassava

Cassava starch

344

Rickard (JE), Asaoka (M) and Blanshard (JMV). **The physico-chemical properties of cassava starch.** *Tropical Science* 31(2): 1991: 189-207

The present paper reviews recent reports on the physico and chemical properties of cassava (*Manihot utilissima*) starch (proximate analysis, granular characteristics, swelling and solubility, gelatinization profiles and enzymic digestibility) in comparison with other starch sources. The effect of cv and methodology used are also reviewed. 58 references. BV

Vegetables

345

Berrang (ME), Brackett (RE) and Beuchat (LR). **Microbial, colour and textural qualities of fresh asparagus, broccoli and cauliflower stored under controlled atmosphere.** *Journal of Food Protection* 53(5): 1990: 391-395

Fresh asparagus, broccoli and cauliflower were held under controlled atm. storage (CAS) and ambient air systems at 4 C for 21 days. Samples were examined on the initial day of experiments and after 2, 4, 7, 14 and 21 days of storage. On each day of analysis, colour (value, chroma and hue angle) was measured. Texture was measured as J needed to shear the vegetable/mm ^{2} vegetable shear surface area. Total aerobic microbial populations were enumerated. Populations of toal aerobic microorganisms were initially about 10^4 - 10^5 CFU/g on all three vegetables and grew to at least 10^7 CFU by day 21 of storage. CAS storage significantly reduced the growth of microorganisms on broccoli but had no significant effect with the other vegetables. Asparagus stored under CAS was easier to shear and had slightly higher hue angles than those of asparagus stored under air. Cauliflower stored under CAS showed less decline in value. CAS extended the length of time vegetables were subjectively considered acceptable for consumption. However, overall results indicate that quality of vegetables, as determined by objective measurements of colour and texture, is not significantly influenced by CAS during refrigerated storage. AS

Brinjal

346

Saikia (L) and Ranganna (S). **Determination of thermal process for curried brinjal (*Solanum melongena*).** *Indian Food Packer* 45(5): 1991: 37-48

The pH (4.3) of fresh brinjal rose to 4.9 when curried necessitating low-acid processing. Thermal

resistance studies gave two D and Z values based on spore concn. of -10^{3} and -10^{4} tube^{-1}. Two methods of calculation of D values were used. Method for comparison of the heat resistance of *Clostridium sporogenes* in terms of classical heat resistance of *C. botulinum* was described. Several procedures for calculation of F-value and calculation of corresponding F 0 and BB by improved graphical and 5 formula methods are described. F 0 recommended for commercial processing of stuffed brinjal is 5.8 min which corresponded to Pt of 75 min at 240 F (115.6 C) and 45 min at 250 F (121.1 C). VKR

Leafy vegetables

Spinach

347
Hussein (L) and El-Tohamy (M). **Vitamin A potency of carrot and spinach carotenes in human metabolic studies.** *International Journal for Vitamin and Nutrition Research* 60(3); 1990; 229-235

Changes in plasma retinol and carotenoids was measured in 17 young males after daily ingestion of grated carrots, carrot juice or spinach leaves for 2 wks. Regression equations showed that the supply of 3350 and 4750 µg carotenes from 78 ml carrot juice (prepared from 185 g carrots) or 91 grated carrots, resp. were adequate in maintaining plasma retinol at a constant level in subjects with initial plasma retinol of 1.2 µmol/l. Under similar experimental conditions, 280 g boiled spinach leaves providing 12700 µg carotenes were required to maintain plasma retinol at a constant level. Apparent carotene digestibilities of 47 and 81% were obtained with carrot and spinach, resp. AS

Plantains

348
Firmin (A). **Chemical and physical changes in plantains (*Musa paradisiaca*) during ripening.** *Tropical Science* 31(2); 1991; 183-187

Ripening of plantain at a temp. of 26 C showed reduction of skin thickness from 3.1 mm (mature green plantain) to 2.6 mm (yellow plantain). Sugar levels increased during ripening from 1.38% (mature green fruits) to 75.5% (very ripe plantains) and starch contents decreased correspondingly from 77.5% to 2.09%. Ripening also increased total acidity of the pulp. BV

Tomatoes

349
Thiagu (R), Nagin Chand, Habibunnisa (EA), Aravinda Prasad (B) and Ramana (KVR). **Effect of evaporative cooling storage on ripening and quality of tomato.** *Journal of Food Quality* 14(2); 1991; 127-144

Evaporative cooling (EC) storage (20 - 25 C, 92 - 95% RH) gave 100% ripening index (RI) with a ratio of 2.48 between redness (a) and yellowishness (b) and hue angle 0 22.1 in 15 days while the control stored tomatoes (*Lycopersicon esculentum* Mill cv. Rupali) (28 - 33 C, 45 - 65% RH) gave 83.3% RI, with a/b 1.59 and a hue angle of 32.9 degree. Significantly higher chroma development and lycopene content, lower nupture/shear stresses and moisture loss in EC stored fruits than the control. SD

Tomato juices

350
Dalmasso (JP) and Weise (KL). **Sensory and chemical effects of tomato juice acidified with malic and citric acids.** *Journal of Food Quality* 14(2); 1991; 145-152

The sensory quality of stored salted/unsalted tomato juice acidified/non-acidified showed no significant difference between non-acidified and malate acidified salted juice after 180 days. In unsalted juice there was significant difference between non-acidified and malate or citrate acidified juice. Malic acid enhanced saltiness of juice. The pH of all juice decreased initially, non-acidified juice returned to normal while that of acidified maintained lower values. SD

FRUITS

351
Tandon (DK), Kalra (SK), Singh (BP) and Neelima Garg. **Characterization of pectin from mango fruit waste.** *Indian Food Packer* 45(4); 1991; 9-12

The pectin was extracted from dry peel and kernel of immature and ripe Dashehari mango using 0.05 N HCl; 0.05 N NaOH and 0.3% sodium hexameta phosphate (SHMP). Yield of pectin (12.79%) was max. from ripe mango peel by SHMP extraction. The kernel of immature fruit contained higher pectin than that of ripe fruit while reverse trend was observed in peels of immature and ripe fruits. The quality of SHMP extracted pectin from ripe mango peel was better than that from immature fruit. Alcohol insoluble solids were higher in kernel from ripe fruit. The water soluble pectin was more in ripe fruit peel (12.8%) while alkali soluble fraction was higher in immature fruit peel (10.4). VKR

352

Rajasekhar (N), Mahadeviah (M) and Gowramma (RV). **Studies on the suitability of retortable pouches for packing banana puree and ivy gourd.** *Indian Food Packer* 45(5): 1991; 29-36

Suitability of retortable pouch from laminate of polyester/Al foil/polypropylene for packing nitrate rich products like banana puree and ivy gourd has been tested and compared with canning. During the 8 wk storage at ambient temp. (25 - 30 C) and 37 C, banana puree and ivy gourd packed in Al foil laminate pouch was preferred to canned product in taste, flavour and overall acceptability. Canned banana puree developed metallic taste and flavour which was not acceptable. There was no significant difference in moisture, ash, pH and acidity in both the products packed in pouch and can. Nitrate content reduced considerably in cans with heavy detinning. VKR

353

Aworh (OC), Nwankwo (CF) and Olorunda (AO). **Control of post-harvest losses in citrus fruits under tropical conditions: Effects of wax and fungicide.** *Tropical Science* 31(2): 1991; 177-182

Waxing (Shield Brite AP 40 wax) minimized wt. loss in oranges and grapefruits stored at 21 - 31 C and 71 - 96% r.h. and when used in combination with washing in 0.1% benomyl or 0.5% sodium dehydroacetate, increased the marketable life and enhanced the appearance without adversely affecting chemical quality attributes. BV

Dates

354

Yousif (AK), Morton (ID) and Mustafa (AI). **Processing, evaluation and water relations of date paste.** *Tropical Science* 31(2): 1991; 147-158

Date (*Phoenix dactylifera*) paste prepared from 'Ruzeiz' dates has a lower a_w value (0.41) and its water sorption isotherm is of sigmoid shape. Date paste contains high levels (78%) of invert sugar, is a good source of minerals and trace elements, and its high level of dietary fiber (7%) is of particular interest. The optimum steaming time is 3 - 5 min and for soaking 5 - 10 min. A moisture content of 23% (0.65 a_w) for date paste could be considered as the lower safe limit for microbial spoilage. Hysteresis is apparent in date paste isotherms and over the entire r.h. range. BV

355

Yousif (AK), Morton (ID) and Mustafa (AI). **Effect of storage and packaging on some chemical and physical properties of date paste.** *Tropical Science* 31(2): 1991: 159-169

The effect of different techniques (soaking, steaming, with or without citric acid or ascorbic acid), storage time (2, 4, 8, 16 wks), storage temp. (5, 25, 50 C) and pack type (can, glass jars and polyethylene bags) on some of the chemical and physical properties of date paste were studied. Date paste retained an acceptable colour for 16, 8 and 2 wks when stored at 5, 25 and 50 C resp. The decrease in both sugar content and pH after 16 wks storage is pronounced at 50 C, whereas it is slight at 25 C and undetectable at 5 C. Moisture loss is considerable in the polyethylene-packed date paste after 16 wks storage. Irrespective of pack type, storage time causes a marked and gradual increase in the hardness of the date paste. Viscosity and a_w are slightly affected by both storage time and pack type. In contrast, neither storage time nor pack type affects the sorption isotherm of the date paste at low and medium relative humidity (7 - 75%). AS

Galgal

356

Mahajan (R) and Lal (BB). **Evaluation studies on Himachal galgal (*Citrus pseudolimon* Tan.) for processing industry.** *Journal of Food Science and Technology (India)* 28(6): 1991: 378-380

Galgals from two geographic locations viz., Palampur and Nurpur in the Kangra valley of Himachal Pradesh were evaluated for physical and chemical characteristics of fruits with special reference to recovery of juice as well as yield and quality of oil and pectin from their processing waste. Yield and quality of oil and pectin were reasonably good from the waste of fruits from both the locations. Pectin yield from rags was much higher than from peel. Methoxyl content, degree of esterification and jelly grade of pectin extracted from rags were higher than those from other fruit components. Alcohol precipitation method gave higher pectin yield of good quality than aluminium chloride precipitation. A good quality oil was obtained by all the methods used for extraction though the cold press method gave the lowest yield. Fruit from Palampur gave higher oil yield. AS

Grapefruits

357

Miller (WR), Chun (D), Risse (LA), Hatton (TT) and Hinsch (RT). **Conditioning of Florida grapefruit to reduce peel stress during low-temperature storage.** *Horticience* 25(2): 1990: 209-211

'Thompson' pink grapefruit (*Citrus paradisi* Macf.), waxed or film-wrapped, treated with thiabendazole (TBZ) or untreated, were used to determine the effect of high-temp. conditioning at 31 C for 3 days on fruit during subsequent storage for 4 wks at 1 or 10 C. Chilling injury (CI) developed in all conditioned fruit stored at 1 C, but was drastically reduced in film-wrapped compared to waxed fruit. Thiabendazole slightly reduced CI, and fruit held at 10 C had fewer CI symptoms than those held at 1 C for 4 wks. Conditioning Florida grapefruit at 31 C for 3 days did not allow subsequent storage at 1 C without rind dicoloration. AS

Grapes

358

Saura-Calixto (F), Goni (I), Manas (E) and Abia (R). **Klason lignin, condensed tannins and resistant protein as dietary fibre constituents: Determination in grape pomaces.** *Food Chemistry* 39(3): 1991: 299-309

Dietary fibre (DF) detn. were carried out in grape pomaces by AOAC and spectrophotometric procedures. Insoluble dietary fibre (IDF) and Klason lignin (KL) residues contained appreciable amounts of condensed tannins (CT) and resistant protein (RP). The presence of CT and RP in the residues obtained after the successive action of amylase, protease and amyloglucosidase and chemical treatments with H_2SO_4 and HCl-triethyleneglycol, together with similar data previously reported for other samples could be considered in a wider definition of the DF complex as 'indigestible polysaccharides, phenolic polymers and resistant protein'. The term 'phenolic polymers' include both lignin and CT. AS

Mangoes

359

Pokharkar (SM) and Suresh Prasad. **Studies on the proteins of mango kernel flour.** *Indian Food Packer* 45(4): 1991: 17-21

Optimum conditions for isolation of protein from the deoiled mango kernel flour was determined. Factors studied included (i) successive extraction, (ii) different particle size (25, 44, 70 and 100 mesh passing), (iii) ratio of sample wt. to solvent vol. (1 g flour mixed with 10, 15, 20 and 30 ml of 2% NaOH), (iv) extraction time (0.5, 1.0, 1.5, 2.0 and 2.5 h), (v) extraction temp. (30, 40, 50, 60 and 70 C), and (vi) different pH levels (pH 1 - 12). Optimum protein could be extracted if the particle size of mango kernel flour of < 100 µ; sample wt. to solvent vol. ratio of 1:20, extraction time of 1.5 h, and temp. of 40 C. Protein extraction is highest (60%) in alkali medium with pH 11. VKR

360

Chakraborthy (S), Bisht (HC), Agareal (MD), Verma (LN), Shukla (IC), Madaiah (N), Krishnaprakash (MS), Nanjundaswamy (AM). **Studies on varietal screening of mangoes of Uttar Pradesh for their suitability for production of canned nectar, juice and pulp.** *Indian Food Packer* 45(5): 1991: 49-57

Suitability of mango var. Dusehari, Chausa, Safeda, Tamburia Dusehari, Mala Fazli, Mallika Bhagwankera and Golbhadiya, grown in Uttar Pradesh, India for processing into canned mango nectar, juice and pulp was studied. The pulp from fully ripe fruits were canned and used for preparing canned nectar and juice. The canned products were stored for 4 - 6 months at ambient conditions (23 - 28 C) and analysed for physical, chemical and sensory qualities. The pulp content was min. (40%) in Safeda var. and max. (70%) in Lucknow Fazli and Golbhadiya var. The total soluble solids was min. (13%) in Golbhadiya and max. (22%) in Dusehari var. Dusehari and Mallika had excellent colour and flavour. Canned nectar and juice from 7 var. were ranked for colour, aroma, taste and overall acceptability. Dasheri and Tamburia Dusehari were as good as Alphonso var. for canned mango nectar and juice. Nectar and juice made from Safeda and Lunknow Fazli were inferior in quality. VKR

361

Ranote (PS), Saini (SPS) and Bawa (AS). **Effect of packaging material on heat penetration in Dusehari mango pulp.** *Research and Industry, India* 36(4): 1991: 249-251

Suitability of flexible container for packing and storage of Dusehari mango pulp was tested by packing mango pulp in bottles (200 ml) and in polypropylene (300 guage) pouches. Cold points for both bottled and pouched mango pulp were found to be at the geometric centre indicating conduction heating. Pulp recovery was 65.5%; av. fruit wt. was 171 g. The trimming and coring losses were 4.2%, peel loss was 12% and handling loss was 3.8%. The pulp contained 22% total solids. It was low in protein (0.43%) and rich in pectin (0.55%). The rate of heat penetration was faster for the flexible container, than the rigid glass bottles, indicating the superiority of flexible pouch for thermal processing as it saves time and energy. GS

Muskmelons

362
Dunlop (JR), Lingle (SE) and Lester (GE). **Ethylene production in netted muskmelon subjected to postharvest heating and refrigerated storage.** *Hortscience* 25(2): 1990: 207-209

Post-harvest ethylene levels and the precursor of ethylene i.e. aminocyclopropane-1-carboxylic acid (ACC) levels were determined in netted muskmelons at two temp. extremes i.e. 45 and 4 C, using sealed polyethylene bags to protect the fruits from high and very low temp. injuries. It was observed that temp. imposed restriction ethylene synthesis was reversible at a step which converts ACC into ethylene while the concn. of ACC remained constant the production of ethylene at different temp. varied. Further experimental details are presented. BV

Plums

363
Robertson (JA), Meredith (FI), Lyon (BG) and Norton (JD). **Effect of cold storage on the quality characteristics of 'AU-Rubrum' plums.** *Journal of Food Quality* 14(2): 1991: 107-117

The size, soluble solids and total sugar contents (glucose, fructose and sorbitol) were significantly higher ($P < 0.05$) in mature plums. Plums stored at 0 C for 5 wk and ripened at 20 C showed no significant effect on physical, chemical or sensory characteristics. The storage life of plums indicate potential for shipment to distant markets. SD

Sweet cherries

364
Drake (SR), Moffitt (HR) and Kupferman (EM). **Quality characteristics of 'Bing' and 'Rainier' sweet cherries treated with gibberellic acid, following fumigation with methyl bromide.** *Journal of Food Quality* 14(2): 1991: 119-125

Gibberellic acid treatment increased firmness, superior fruit and stem colour with less pitting in sweet cherries. Methyl bromide fumigation did not influence wt. loss, fruit colour or soluble solids, increased pitting and reduced objective and subjective stem colour. Increased fumigation temp. increased bruising and pitting and decreased stem colour. SD

CONFECTIONERY, STARCH AND SUGAR

Chocolate

Cocoa beans

365
Bopaiah (BM). **Studies on cocoa processing. III. Cotyledon pH as an index of fermentation.** *Indian Cocoa, Arecanut & Spices Journal* 14(4): 1991: 145-147

The termination of fermentation and the withdrawl of beans for drying is important to obtain quality beans. This could be decided by monitoring the cotyledon pH. During the initial stage of fermentation (first 48 h), the cotyledon pH lowered. The pH was min. on 3rd and 4th day of fermentation thereafter it increased. The following pH range is suggested for the termination of fermentation - sun-drying pH 4.8 to 5.1; slow artificial drying pH 4.9 to 5.1; quick artificial drying pH 5.2 to 5.3. GS

366
Rossi (M), Arnoldi (C), Antoniazzi (F) and Schiraldi (A). **Supercritical fluid extraction of cocoa lipid with carbon dioxide.** *Italian Journal of Food Science* 1(3): 1989: 31-40

Supercritical fluid has proved to be suitable for the extraction of various lipid-bearing materials. The feasibility of application of this technology in the cocoa industry is investigated here through the study of the solubility of cocoa fat in supercritical CO_2 as a function of temp. and pressure. Extraction trends for three different cocoa products, namely liquor, unroasted nibs and some fat-rich shells, are also reported. At pressures over 300 bar, cocoa fat solubility increases as the temp. and pressure increase. In the case of the liquor, a high degree of disruption of the lipid-bearing cells is obtained and this allows for an extraction yield of almost 100%. AS

367
Rossi (M), Arnoldi (C), Salvioni (G) and Schiraldi (A). **Characterization of cocoa extracts obtained with supercritical carbon dioxide.** *Italian Journal of Food Science* 1(3): 1989: 41-50

The composition of extracts obtained by supercritical CO_2 extraction of cocoa liquor, unroasted nibs and shells is examined. A minor variation in the composition of the triglyceride extract as a function of extraction time appears to be due to varying selectivity of supercritical CO_2 for triglycerides of different chain lengths. The effect, which is negligible when extraction is performed at 400 bar, becomes more evident at an extraction pressure of 300 bar. Fat obtained from the

extraction of liquor satisfies the composition requirements for cocoa butter, while that obtained from shells is distinguished by its excessive content of linoleic acid and unsaponifiable matter. AS

Starch

368

Meuser (F), Gimmler (N) and Oeding (J). **System analytical consideration of derivatization of starch with a cooking extruder as reactor.** *Starch/Starke* 42(9): 1990: 330-336 (De)

A methodical procedure is presented with which a systematic examination was made of the influence of the extrusion conditions on the degree of derivatization of potato starch to cationic and carboxymethyl starches. The procedure is based on a systems analysis approach originally developed for the extrusion of starch and starch-containing substances. Using regression equations it could be shown that, during the derivatization of starch, functional relationships also exist between the process and the most important system parameters (product temp., specific mechanical energy input, mean residence time). However, these parameters alone are insufficient to be able to describe the relationship between the system and the structure parameters, of which the reaction efficiency (R.E.) is considered to be the most important. A correlation calculation in which the moisture content was included as a fourth system parameter resulted in a far better description of the functional relationship between the system parameters and the R.E. on which the degree of substitutions is directly dependent. However, it is not possible to present this 4-dimensional dependence graphically. For this reason further systems analysis was carried out under conditions of constant moisture content. In this approach the cold paste viscosity (CPV) of the derivatives, as an example for the physico-chemical properties of the derivatives produced by extrusion cooking, were included in the systems analysis model. It emerged from the results that the pH-value of the extruders decisively influenced the CPV. With the aim to find extrusion cooking conditions which enable a max. R.E., the graphical representation of the dependence of the R.E. from the system parameters was extrapolated beyond the investigated examination area. Control tests showed that the regression equations could not describe the relationships outside the investigated area. AS

369

Hansen (LM), Hoseney (RC) and Faubion (JM). **Oscillatory rheometry of starch-water systems: Effect of starch concentration and temperature.** *Cereal Chemistry* 68(4): 1991: 347-351

An oscillatory probe rheometer was used to measure the rheological properties (G*, G' and G") of corn starch-water systems throughout the sol-to-gel transformation. Starch-water suspensions of 5, 7, and 10% (w/w) were heated to endpoint temp. (EPTs) of 81, 86 and 92 C, and the rheological properties of the pastes and resulting gels were measured. As starch concn. increased, G' increased. For all concn. analyzed, G' varied depending on EPT. In general, G' was lower for suspensions heated to 81 C than for suspensions heated to 86 or 92 C. The temp. of the sol-to-gel transformation was determined from the slope of the loss tangent and was dependent on starch concn. and EPT. The higher the starch concn. the higher the temp. of the sol-to-gel transformation. Regression analysis determined that the amount of amylose and amylopectin leached from the granules, the swelling power of the granules, and the insoluble granules all interact and affect the rheological properties of the resulting gel. High soluble amylose levels and swelling powers increased gel elasticity, whereas high levels of soluble amylopectin were detrimental to gel formation and reduced elasticity. AS

370

Conde-Petit (B) and Fischer (F). **Rheological investigations with starch emulsifier systems.** *Getreide-Mehl und Brot* 45(5): 1991: 131-135 (De)

Sugar

371

Nath (S), Jain (SK), Gupta (SK) and Shah Alam. **A review on deterioration of sugar in godowns.** *Indian Sugar* 41(6): 1991: 389-392

The article briefly reviews how the important factors like humidity, temp. and microorganisms cause deterioration of sugar in storage. The deterioration could be checked by controlling the above three factors and also properly designing the sugar godowns to minimise the ingress of moisture. 17 references. SRA

372

Patel (HS), Mehta (NJ), Patel (MP), Vashi (RD) and Mevada (KD). **Effect of phosphatic fertilizers on yield and quality of sugarcane.** *Indian Sugar* 41(6): 1991: 395-397

A field trial was conducted on clayey soil of Navasari in rabi seasons of 1985-86 and 1986-87 comprising five sources of phosphatic fertilizers. All phosphorus and potash at 100 Kg/ha each were applied at planting while N at 1250 Kg/ha was applied in three splits. Results showed that the

sources of phosphatic fertilizer did not influence the cane yield and juice quality. Phosphorus in any form significantly enhanced commercial cane sugar %. SRA

373

Bangar (KS), Sharma (SR) and Sharma (RK). **Effect of iron and zinc on yield and quality of sugarcane.** *Indian Sugar* 41(6): 1991: 403-404

A field experiment was conducted in 1988-89 at the research farm, with popular sugarcane cv. CO 6304 with the application of ferrous sulphate (25, 50 and 75.0 kg/ha) and zinc sulphate (20, 50, 75 kg/ha) in clay loam soils having pH 7.8. Results showed that the application of 75 kg/ha each of $FeSO_4$ and $ZnSO_4$ increased the sucrose content to a max. of 17.18 and 16.60% resp. but the recovery % was max. at 50 kg/ha both $FeSO_4$ and $ZnSO_4$. SRA

BAKERY PRODUCTS

374

Rama (MB). **Functions of ingredients in the manufacture of bakery products.** *Indian Miller* 22(1): 1991: 20-22

Various ingredients that are used in the manufacture of bakery products (bread, biscuits, cakes, pasteries, puff pasteries, patties and buns of various types, doughnuts and pizzas) include wheat flour, sugar, fat, emulsifiers, yeast, milk products, sugar products, liquid glucose, malt extract, egg flavouring agents, colouring agents, preservatives, proteolytic and amylolytic enzymes. The role of these ingredients, the quantity to be added and the latest trends have been briefly reviewed. SRA

375

Brochetti (D) and Penfield (MP). **Sensory characteristics of bakery products containing distillers' dried grain from corn, barley and rye.** *Journal of Food Quality* 12(6): 1989: 413-426

A commercially available distillers' dried grain (DDG) was chemically and physically characterized and the effects of varying levels of the DDG on the sensory characteristics of bakery products were studied. Total dietary fiber (51.22%) and protein (26.59%) were the principal constituents of the DDG. Compared with all-purpose flour, the DDG was more acidic, absorbed more water and oil, and was darker in colour. Consumer panels evaluated the acceptabilities and intensities of sensory characteristics of corn muffins, hush puppies, spiced doughnuts, and molasses-raisin cookies containing 10, 20 and 30% DDG (flour-wt. basis). As the replacement level of DDG increased, the appearance, flavour and texture of the products were adversely affected: however, acceptable products were prepared with either 10 or 20% DDG. AS

376

Fasse (H). **Product liability with baked products.** *Getreide-Mehl und Brot* 45(5): 1991: 152-153 (De)

Bread

377

Sidhu (JS), Seibel (W) and Meyer (D). **Gelatinization of starch during preparation of Indian unleavened flat breads.** *Starch/Starke* 42(9): 1990: 336-341

The comparison of starch granule deformation and extent of starch gelatinization in a few common Indian unleavened flat breads (Chapati, Parotha and Poorie) was made. The starch granule swelling was evaluated by scanning electron as well as polarized light microscopy. The peak viscosity in Haake rotary viscosimeter and hydration capacity were used for comparing the extent of starch gelatinization in crust and crumb of these baked products. Although a few of the starch granules on the outside of crust, maintained a weak outline those in the crumb area gave only a matrix of gelatinized starch. The extent of starch gelatinization was reflected by the related increase in hydration capacity of these products. However, the peak viscosity values were found to be inversely related to the extent of starch gelatinization. As compared to crumb, a higher extent of browning was observed in the crust. Water absorption, type of cereal, mode and efficiency of heat transfer were found to control the extent of starch gelatinization in these baked products. AS

378

Defloor (I), De Geest (C), Schellekens (M), Martens (A) and Delcour (JA). **Emulsifiers and/or extruded starch in the production of breads from cassava.** *Cereal Chemistry* 68(4): 1991: 323-327

A nutritious breadlike product can be prepared from cassava (*Manihot esculenta* Crantz) flour fortified with defatted soy flour (20%) by incorporation in the formula of either a viscosity-enhancing agent such as prehydrated extruded starch (12 - 15%) or surface-active materials such as self-emulsifying glyceryl monostearate (2 - 3%). The latter agent results in a greater air uptake at mixing, as exemplified by greater volumes at the end of the mixing stage, and both agents lead to improved gas retention during fermentation. Experimental data suggest that gas retention in the first phase of fermentation of cassava batters is influenced only to

a small extent by the agents applied and that their action is based on a delay of the attainment of the critical buoyant size of the gas cells. Whereas the delay by the surface-active agent is based on the fact that more and smaller gas cells are formed during mixing, the effect of the pregelatinized material is due to a viscosity change, resulting in an increase of the critical buoyant size. During the baking phase, they influence the pasting properties of the starch and have a positive impact on the volume and crumb structure of the resulting products. Incorporation of surface-active material (4%) leads to a volume increase of 30%, whereas a much greater quantity of extruded starch (9 - 12%) is necessary to ensure a more modest volume increase (12%). At the same time, both the emulsifier and the extruded starch are responsible for good eating and keeping qualities. AS

379

Pomeranz (Y), Huang (M) and Rubenthaler (GL). **Steamed bread. III. Role of lipids.** *Cereal Chemistry* 68(4): 1991; 353-356

The effects on volume, compressibility (softness), and overall score of Chinese steamed bread of flour lipids, shortening and vegetable oils, and emulsifiers (hydroxylated lecithin, distilled monoglycerides, and ethoxylated monoglycerides [EMG]) added to an untreated and a petroleum ether defatted soft white wheat flour were determined. Defatting significantly reduced volume and softness of steamed bread. The control, defatted, and reconstituted flours showed a shortening response. Doubling the amount of added free lipids (from 0.86 to 1.72%) had no additional restoring effect beyond that from reconstituting the defatted flour to the original level of free lipids. Shortening at the 2% level provided the best steamed bread; replacing shortening by soybean or corn oil produced comparable breads. In defatted flour, 0.1% EMG and especially 0.2% hydroxylated lecithin, alone or in combination with 2% shortening, increased volume and improved softness; each was superior to shortening alone. Adding 0.1% EMG and especially 0.2% lecithin to defatted flour baked with 1 or 2% corn oil increased volume and softness of steamed bread. None of the combinations among lecithin, EMG, or distilled monoglycerides was superior to any of the single emulsifiers. AS

380

Seibel (W), Brummer (J-M) and Neumann (H). **Production of oat bread (labelling, nutritive value, raw materials, process engineering).** *Getreide-Mehl und Brot* 45(5): 1991; 140-145 (De)

Cake

381

Delcour (JA), DeGeest (C), Hoseney (RC) and Sheike (K). **Glycine derivatives as the source of carbon dioxide in cake formulations.** *Cereal Chemistry* 68(4): 1991; 369-371

Two glycine derivatives - N-carboxyglycine disodium salt (CAS 35783-03-0) and its glycine salt - were studied as alternative sources of CO_2 for leavening cakes. The release of CO_2 from these products was governed by the same pK_a value as that for sodium bicarbonate. When used in combination with fast, moderately fast, or slow leavening acids, the volumes of the final products prepared with glycine derivatives compared well with those of cakes prepared with sodium bicarbonate. Thus the glycine derivatives appeared equal to sodium bicarbonate in this respect. The products prepared with the different CO_2 sources all appeared similar except for crust colour, which was pleasantly darker in the cakes with the glycine derivatives. AS

Chapathies

382

Syed (HM), Rathi (SD) and Sawate (AR). **Studies on improving the chapathi quality.** *Indian Miller* 22(1): 1991; 26-31

The whole meal atta from HD-2189, N-59, and GC-464 wheat var. were used to prepare chapathies. The dough was fermented for 2, 4 and 8 h with and without the addition of lactic acid. Chapathi baking characteristic showed that the dough colour of HD-2189 and N-59 was creamish and GC-464 was dull white. The dough behaviour during handling was normal in all three var. N-59 chapathies were fully puffed, GC-464 were near to full puffing and HD-2189 were partially puffed on baking. The baking loss was 19.85 to 21.00%. The colour of control chapathies was whitish or creamish yellow, and were liked by consumers. The flavour was not affected by 4 to 8 h fermentation of dough using baker's yeast (0.5%). In general the texture of chapathies was improved by fermentation with or without lactic acid. The puncture strength was max. in chapathies prepared from GC-464 followed by HD-2189 and N-59. Fermentation produced chapathies requiring more strength to puncture as compared to yeasted and/or acidified chapathies. Lactic acid softened the chapathies more than yeasted chapathies. Even after 12 h of storage of chapathies prepared from pH adjusted yeasted dough and rested for 4 to 8 h, required only 50% of puncture strength as that of control fresh chapathies. SRA

Cookies

383
Ranhotra (GS), Gelroth (JA) and Eisenbraun (GJ). **High-fiber white flour and its use in cookie products.** *Cereal Chemistry* 68(4): 1991: 432-434

White flour subjected to repeated autoclaving and cooling cycles showed an increase in total dietary fiber more than three times of bread flours and four times that of pastry flours. The increase was primarily due to the formation of resistant starch. The treated flour was substituted for 75 and 50% of the untreated flour of the formula for chocolate chip and oatmeal raisin cookies, resp., before physical and organoleptic characteristics became adversely affected. AS

Pasta

384
Cole (ME). **Prediction and measurement of pasta quality.** *International Journal of Food Science and Technology* 26(2): 1991: 133-151

Flavour, appearance, texture measurement (sensory techniques, instrumental techniques and chemical techniques) of pasta has been reviewed in this article. 139 references. BV

385
Pavan (G). **Market tendencies and technological aspects of fresh pasta.** *Getreide-Mehl und Brot* 45(5): 1991: 156-159 (De)

MILK AND DAIRY PRODUCTS

Milk

386
Pandey (JN). **Induction of lactation and utilization of milk for human consumption.** *Indian Dairyman* 43(11): 1991: 493-500

A review of the published data on harmone induction to cows and utilization of the milk produced. Evidence has been provided to indicate that milk from cows induced to lactate through administration of gonadal steroids is comparable to milk from parturient cows. The milk is a poor source for excretion of injected harmones and after the 3rd wk of induced lactation the levels of estrogens in milk are no more than under normal lactation. SRA

387
Batish (VK), Nataraj (B) and Sunita Grover. **Heat resistance of enterotoxigenic *S. aureus* in milk, reconstituted infant food and cream.** *Journal of Food Science and Technology (India)* 28(6): 1991: 391-393

Heat treatment of cells of *Staphylococcus aureus* strains 234, 834, 1151M, 790, S 6 and non-enterotoxigenic (NT) in different menstrua at 50, 55, 62.5 C for different time intervals resulted in their non-logarithmic death and hence F-values were determined. *S. aureus* 234 was the most heat resistant in both cow and buffalo milks as well as reconstituted infant food as evidenced by an F value of more than 120 min at 62.5 C. It was followed by *S. aureus* S 6, 834, 1151M and 790. Buffalo milk conferred maximal protection to all the strains. The maximal recovery of *S. aureus* after heat treatment was recorded with soybean-casein-digest-agar as compared with Baird Parker's agar. Both *S. aureus* 234 and S 6 survived at 71 C in pasteurized cream upto 120 min. The typical colony characteristics of the survivors from the cream on Baird Parker's medium were altered. AS

388
Jackman (R), Chesham (J), Mitchell (SJ) and Dyer (SD). **Performance of a rapid ELISA for penicillin G in milk.** *Journal of the Society of Dairy Technology* 43(4): 1990: 93-95

A rapid enzyme-linked immunosorbent assay (ELISA) for the detection of penicillin G in milk at concn. of 6 ng/ml (0.01 IU/ml) was used to screen 1651 off-farm samples previously reported as containing no detectable levels of antimicrobial substances. Using a single-well per test format and a percent inhibition cut-off for the detn. of positive/negative endpoint, 3.1% positives were obtained. Comparison with intra-assay standards lowered the numbers of positives to 0.42%. Analysis of 170 milk samples positive for antimicrobials confirmed 92.4% as containing penicillin G using the prescribed cut-off level and 87.6% when compared to standards. The ELISA, now available commercially in kit form, analyses between 1 and 48 samples in 15 min. It will detect 0.01 IU/ml to a level of confidence of 99% and 0.005 IU/ml with between 75 and 95% confidence. AS

389
Grufferty (MB) and Mulvihill (DM). **Hydration related properties of protein isolates prepared from heated milks.** *Journal of the Society of Dairy Technology* 43(4): 1990: 99-103

The hydration related properties of sodium caseinate, conventional casein-whey protein co-precipitate prepared from milk heated at 90 C x

15 min at pH 6.6 and milk protein isolates prepared from milk heated at 90 C x 15 min at pH 7.5 or at 60 C x 3 min at pH 10.0 were determined. Conventional acid-precipitated casein and the acid-precipitated protein isolates prepared from milks heated at pH > 7.0 had similar solubility and reconstitution properties which were better than those of a conventional co-precipitate. Water sorption isotherms for all the proteins were similar. Viscosities followed the order: conventional co-precipitate > milk protein isolates > sodium caseinate. AS

390

Heape (J). **The role for goats in today's dairy industry.** *Journal of the Society of Dairy Technology* 43(4): 1990: 111-114

391

Champagne (CP), Girard (F) and Morin (N). **Inhibition of the psychrotrophic bacteria of raw milk by addition of lactic acid bacteria.** *Journal of Food Protection* 53(5): 1990: 400-403

The inhibitory activity of lactic acid bacteria (LAB) on the psychrotrophic bacteria of raw milk was studied with reference to inoculation level, pH development, media for culture preparation and heat treatment of milk. Two commercial cultures of LAB:RMI and L-12 were used in this study. Inoculation levels of 2.5 x 10^6/ml and less of LAB did not significantly reduce psychrotrophic growth. Max. inoculation level of LAB studied was 25 x 10^6/ml and this reduced psychrotrophic development by a factor of 10; however, milk pH was reduced to 6.54 over 48 h of incubation at 7 C with this inoculation level. This acidification was not responsible for the inhibitory activity of LAB on psychrotrophs. The LAB were more effective when psychrotroph populations had high multiplication rates. *Pseudomonas putida* grew faster in sterile milk than in pasteurised milk, but av. inhibition rates of LAB were similar in both media. BV

392

Halpin-Dohnalek (MI) and Marth (EH). **Growth of *Staphylococcus aureus* in milks and creams with various amounts of milk fat.** *Journal of Food Protection* 52(8): 1989: 540-543

Staphylococcus aureus strains 100-A, 196-E, 254, 473, 505, and 521 generally grew better in skim milk and whole milk (3.5% milk fat) than in light cream (18% milk fat) and heavy whipping cream (36% milk fat) at 25 and 37 C. *S. aureus* strains grew to greater than 10^6/ml from an inoculum of ca. 10^3/ml in skim and whole milk held at 37 C. From the same level of inoculum, strains grew to 10^6 - 10^7/ml in light cream held at 37 C. A 10 to 100-fold increase in population was observed for most strains in heavy whipping cream inoculated with ca. 10^4 *S. aureus*/ml and held at 37 C. Less than a 10-fold increase in population was noted for strain 254 in heavy whipping cream held at 37 C. When strains of *S. aureus* were inoculated into milks and creams and held at 25 C, populations of the pathogen increased approx. 100-fold in skim and whole milk and 10-fold or less in light cream and heavy whipping cream. *S. aureus* was enumerated using Chapman Stone, Mannitol Salt, Baird-Parker and Vogel-Johnson agars. Best results were obtained with Baird-Parker and Vogel-Johnson agars, particularly when high-fat fluid products were tested. Milk fat content, incubation temp., and strain variation influenced the ability of *S. aureus* to grow in various dairy fluids. AS

393

Resmini (P), Pellegrino (L), Hogenboom (JA) and Andreini (R). **Thermal denaturation of whey protein in pasteurized milk. Fast evaluation by HPLC.** *Italian Journal of Food Science* 1(3): 1989: 51-62

Reversed phase HPLC of the isoelectric whey, on polymeric column and with fluorescence monitoring, has been applied to determine the extent of denaturation of whey protein in pasteurized milk. By means of industrial HTST pasteurization, carried out at temp. ranging from 72 to 90 C and holding times from 2 to 45 sec, isodenaturation curves versus heating time-temp. were obtained and compared with the denaturation values found in market milk samples processed under known conditions. The immunoglobulin denaturation, whose kinetics are reported, proved to be the best parameter for checking the processing conditions of pasteurized milk, even if low-heat treated. The peak area ratio (immunoglobulin + bovine serum albumin)/β-lactoglobulin is useful for checking both the extent of denaturation of whey proteins in pasteurized milk without the availability of the raw milk, and for determining if the min. levels of soluble whey proteins specified by Italian law are being respected. AS

394

Addeo (F), Moio (L), Chianese (L) and Nota (G). **Evaluation of bovine and water buffalo milk in mixtures of liquid milk and Mozzarella cheese by gel isoelectric focussing.** *Italian Journal of Food Science* 1(3): 1989: 71-80

A method for the detection of bovine milk in water buffalo milk and in Mozzarella cheese has been developed. The method consists of (1) the *in vitro* formation of γ 2- and γ 3-caseins by the addition of plasmin to cheese or casein solution; (2) their

subsequent detection by polyacrylamide gel isoelectric focusing in the pH range of 5 - 8; (3) a densitometric evaluation of the electrophoretic bands. The procedure allows for a simultaneous estimation of bovine and water buffalo milk quantities in milk or cheese in amounts as low as 1% of the added milk. The level of adulteration was determined either by using a calibration plot established by analysing cheese samples containing known amounts of milk from the two species or by calculating the ratio of bovine γ_2-casein to the total γ_2-caseins. This method has been found to give reliable results even in the case of cheese stored for several days at room temp. AS

395

Grover (S), Batish (VK) and Srinivasan (RA). **Production and properties of crude enterotoxin of *Pseudomonas aeruginosa*.** *International Journal of Food Microbiology* 10(3/4): 1990: 201-208

Pseudomonas aeruginosa CTM-3 was found to be the most potentially enterotoxigenic strain out of the 12 isolates recovered from milk, as a high fluid length ratio, i.e. F/L (1.1) in rabbit gut and a strong permeability response in rabbit skin (38.5 mm^2 necrotic zone) was obtained with this culture. No clear-cut relationship between the two tests was observed. Six of the ethidium bromide (300 µg/ml) cured variants of this culture completely lost their ability to produce enterotoxin indicating the possible involvement of a plasmid in enterotoxin synthesis. The crude enterotoxin from *P. aeruginosa* CTM-3 was completely inactivated in 15 sec at 72 C. However, it was fairly stable at pH values in the range 4.5 - 7.5. Both pepsin and trypsin inactivated the enterotoxin activity at a concn. of 40 µg/ml. Organic acid, formalin and hydrogen peroxide had no significant effect on the enterotoxin activity. The need for further investigations with purified preparations is emphasized. AS

396

Misra (AK) and Kuila (RK). **The selection of bifidobacteria for the manufacture of fermented milks.** *Australian Journal of Dairy Technology* 46(1): 1991: 24-26

Three strains of *Bifidobacterium bifidum* strains isolated from the stools of infants fed breast milk exclusively, and 4 standard strains of the same organism (NCDO 1452, NCDO 1453 and NCDO 1454 of UK and NDRI Karnal, India) were examined for their suitability in the manufacture of fermented milks. On the basis of dietetic criteria, *B. bifidum* strains NCDO 1452, NCDO 1454 and NDRI would be the most suitable for fermented milk manufacture. When both dietetic and technological criteria are considered, NDRI strain is the best for manufacture of *B. bifidum* based fermented milks. GS

397

Mittal (SB), Newell (G), Hourigan (JA) and Zadow (JG) **The effect of protease contamination in lactase on the flavour of lactose-hydrolyzed milks.** *Australian Journal of Dairy Technology* 46(1): 1991: 46-47

This paper deals with the levels of protease contamination in commercial lactases, variability in commercial preparations and effect on flavour of recombined milk. BV

Milk products

398

Goyal (GK). **Practice and research related to packaging of indigenous dairy products - a review.** *Indian Dairyman* 43(11): 1991: 489-492

This review article briefly covers aspects like functional packaging, research on dairy packaging, popularity of indigenous dairy products, packaging practice and packaging research done on milk based sweetmeats and fermented dairy products. SRA

399

Johnson (EA), Nelson (JH) and Johnson (M). **Microbiological safety of cheese made from heat-treated milk. Part I. Executive summary, introduction and history.** *Journal of Food Protection* 53(5): 1990: 441-452

400

Smith (LB), Zottola (EA), Fox (TL) and Chausse (K). **Use of Petrifilm ™ to evaluate the microflora of frozen dessert mixes.** *Journal of Food Protection* 52(8): 1989: 549-551

Ninety vanilla frozen dessert mix samples were analyzed to determine total microbial populations and coliforms present in samples inoculated with a coliform isolated from raw milk. Standard methods agar (SMA, PCA, Difco) and violet red bile agar (VRBA, Difco) as well as Petrifilm ™ (PSM, PVRB) were used for plating of samples. Standard VRBA 1:10 method produced significantly higher counts of colony forming units (CFU) than PVRB 2:3 and VRBA 2:3 methods. VRBA 2:3 CFU counts were also significantly higher than those on PVRB 2:3, but both methods showed a moderately strong linear relationship. Repeatabilities of all three coliform plating methods (VRBA 1:10, VRBA 2:3 and PVRB 2:3) were acceptably low. Less than 10% of samples plated on SMA and PSM resulted in total aerobic

CFU in the countable range, making evaluation of data difficult and resulting in a lack of strong linear relationship between PSM and SMA. An additional 70 local retail store samples containing naturally occurring coliforms were evaluated using PVRB 2:3 and VRBA 1:10 methodology, confirmed in brilliant green lactose bile broth (BGLB, Difco) and compared to standard VRBA 1:10 previously analyzed. All methods were equivalent for mean log coliforms, i.e., 1.38, 1.33 and 1.31 for PVRB 2:3, VRBA 2:3 and VRBA 1:10, resp. Petrifilm ™ methods were comparable to standard methods for enumerating coliforms in frozen dairy products, and would be a valid alternative to standard coliform and total plate count methods. AS

Butter

401

Wadhwa (BK), Surinder Kaur and Jain (MK). **Enhancement of the shelf-life of flavoured butter oils by synthetic antioxidants.** *Journal of Food Quality* 14(2): 1991: 175-182

The shelf-life of flavoured butter oils was significantly enhanced by BHA, BHT both at 0.02% level and TBHQ at 0.005% level. SD

Cheese

402

Ganguli (NC). **Cheese base - a base for new foods in its own right.** *Indian Dairyman* 43(10): 1991: 449-451

Cheese base is a stable form of young cheese solids with the same comp. and functional properties as young Cheddar cheese. It is used as a substitute for young cheese in processed cheese upto 50% of the blend in making processed cheese. The advantage of the cheese base is that the yield is at least 16% higher compared to traditional cheese made from the same amount of milk. This paper reviews the principle steps involved in the manufacture of cheese base, characteristics, and properties of cheese base. SRA

403

Sinha (AK) and Ranjan (KS). **A report of mycotoxin contamination in Bhutanese cheese.** *Journal of Food Science and Technology (India)* 28(6): 1991: 398-399

Nine dominant fungi were isolated from 19 samples of cheese obtained from Bhutan. The incidence of *Aspergillus ochraceus* was max. (74%) followed by *Penicillium citrinum (68%). Twelve of the 19 cheese samples were found to be contaminated with different levels of mycotoxins. Citrinin was detected in max. number of cheese samples (6), either alone or as co-contaminant with ochratoxin A. Three samples of cheese were also contaminated with aflatoxins.* AS

404

Hodgson (R). **Marketing speciality cheese to the consumer.** *Journal of the Society of Dairy Technology* 43(4): 1990: 96-98

Mozzarella cheese

405

Jana (AH) and Upadhyay (KG). **The effects of homogenization conditions on the textural and baking characteristics of buffalo milk Mozzarella cheese.** *Australian Journal of Dairy Technology* 46(1): 1991: 27-30

Homogenization of buffalo milk at 25 or 50 kg/cm ^{2} pressure and 50 C temp. resulted in Mozzarella cheeses which were superior to controls with regard to flavour and fat leakage, but inferior in stringiness, textural properties (hardness, cohesiveness, springiness, gumminess and chewiness) and meltability of the cheese. GS

Paneer

406

Singh (L), Murali (HS) and Sankaran (R). **Extension of shelf-life of paneer by sorbic acid and irradiation.** *Journal of Food Science and Technology (India)* 28(6): 1991: 386-388

Paneer, an acid and heat coagulated milk product, is highly perishable because of high moisture (58 - 60%) and low acidity (pH 5.6 - 5.8). The product had 430 total plate count, 120 proteolytic bacteria, 170 lipolytic bacteria and 40 fungi/g of sample with a shelf-life of few hr. Treatment with sorbic acid and/or gamma irradiation reduced the microbial load. Combination treatment of 0.10% sorbic acid in milk and irradiation of the product at 2.5 kGy preserved the paneer for 30 days at ambient temp. (25 - 35 C) with good acceptance. AS

Sandesh

407

Sen (DC) and Rajorhia (GS). **Production of *Narampak sandesh* from buffalo milk.** *Journal of Food Science and Technology (India)* 28(6): 1991: 359-364

The technology of *narampak sandesh* production from buffalo milk with reference to its sugar level, fat content in milk and the method of heating during cooking was standardised. On the basis of sensory evaluation, best results were indicated with the use of 30% crystalline cane sugar and 4% fat in milk. For a good quality *sandesh* preparation, slow process of heating was essential. Addition of *channa* in two instalments markedly improved the body and texture of the finished product. Chemical and microbiological results obtained would be useful in formulating the standards of *narampak sandesh*. AS

Shrikhand

408

Prajapati (JP), Upadhayay (KG) and Desai (HK). **Study on the influence of post-production heat treatment on quality of fresh shrikhand.** *Journal of Food Science and Technology (India)* 28(6): 1991: 365-367

The post-production heat treatment of shrikhand had no adverse effect on its av. comp., titratable acidity, pH, precipitated protein, syneresis, flavour, body and texture characteristics. There was slight improvement in the consistency of the product. It had a marked destructive effect on groups of microorganisms studied depending in severity of heat treatment and the type of microorganisms involved. AS

Wheys

Whey protein concentrates

409

Williams (TV), Versteeg (K) and Houlihan (AV). **The effect of pasteurisation of cheese milk and whey on the major lipid components of whey protein concentrates.** *Australian Journal of Dairy Technology* 46(1): 1991: 36-39

Pasteurisation of cheese milk and whey affected the amount and composition of whey protein conc. (WPC) lipids. Pasteurisation of milk increased the proportion of phospholipids and reduced the neutral lipid fraction. GS

Yoghurts

410

Balasubramanyam (BV) and Satish Kulkarni. **Standardisation of manufacture of high fat yoghurt with natural fruit pulp.** *Journal of Food Science and Technology (India)* 28(6): 1991: 389-390

Yoghurt made from milk with 8% sugar and homogenised at 200 bar pressure was found to be of good quality. Addition of mango pulp upto 4% of milk marginally improved the flavour characteristics. Addition of mango pulp higher than 4% affected the delicate yoghurt flavour and also the body and texture characteristics irrespective of homogenisation pressure. Homogenisation at higher pressure was observed to reduce the whey separation and also resulted in smoother consistency. Addition of mango pulp increased the softness and syneresis of yoghurt. Homogenisation at 200 bar pressure was observed to improve the consistency, water holding capacity and also the sensory characteristics. The Penetration value (PV) and syneresis were observed to decrease with the increase in the homogenisation pressure. AS

MEAT AND POULTRY

Meat

411

Bastos (DHM) and Areas (JAG). **Lung proteins: Effect of defatting with several solvents and extrusion cooking and some functional properties.** *Meat Science* 28(3): 1990: 223-235

Dried lung defatted with several solvents was texturized by extrusion cooking. The emulsifying capacity, water absorption capacity (WAC), and protein solubility, at different pH and $MgCl_2$ concn., of this material were determined prior to and after extrusion, as well as the texture profile analysis of the rehydrated extrudates. Solubility profile and emulsifying capacity of the lung proteins varies in relation to the solvent used in their defatting while the WAC was not affected. The extrusion of these materials promoted a higher solubilization of the protein fraction. The texture parameters of the extrudates studied and the solvent used to defat this material are related, indicating that the lipid-protein complex, left after solvent extraction, may play an important role in the texturization process of lung proteins. AS

412

Trout (GR). **The rate of metmyoglobin formation in beef, pork and turkey meat as influenced by pH, sodium chloride and sodium tripolyphosphate.** *Meat Science* 28(3): 1990: 203-210

This study investigated the effects of pH (5.5 to 7.0), NaCl concn. (0.0 - 3.0%), and sodium tripolyphosphate (STP) concn. (0.0 and 0.5%) on the

rate of metmyoglobin formation in ground beef, pork and turkey meat during refrigerated storage. Increasing the NaCl concn. produced a progressive increase in the rate of metmyoglobin formation in ground beef. Increasing the pH between pH 5.5 and 6.5 had no effect on the rate of metmyoglobin formation with ground beef and turkey meat, but produced a marked decrease between pH 6.5 and 7.0. In contrast, pH had no consistent effect on the rate of metmyoglobin formation of ground pork and the rate of formation remained low at all pH levels. When ground beef contained 0.5% STP, the effect of pH was reversed and the rate of metmyoglobin formation was lowest at pH 5.5, increased as the pH increased to 6.5 and then plateaued. AS

413

Nortje (GL) Nel (L), Jordaan (E), Badenhorst (K), Goedhart (G), Holzapfel (WH), Grimbeek (RJ). **A quantitative survey of a meat production chain to determine the microbial profile of the final product.** *Journal of Food Protection* 53(5): 1990: 411-417

Microbial profile with reference to psychrotrophs, enterobacteriaceae, enterococci, micrococci, *Pseudomonas* spp. and *Brochothrix thermosphacta* was determined in samples from carcasses, personnel surfaces, equipment and minced meat, packaged and displayed in cabinets which were taken at a city abattoir, a wholesaler and to different supermarkets. The non-integrated production system of abattoirs, wholesalers and retailers yielded higher counts of enterobacteriaceae and micrococci. Besides psychrotrophs, the pseudomonads were the most numerous group in the final product. At the abattoir, the enterobacteriaceae and pseudomonads were the biggest contributors to the psychrotrophic count, at the wholesaler the enterobacteriaceae and micrococci counts and at the retailers the micrococci and psudomonads, resp. This indicates that enterobacteriaceae might be common psychrotrophs in the meat production chain, may be originating from the abattoir and wholesale environments. BV

414

Trout (GR). **Prevention of colour defects in meat and meat products.** *Food Australia* 43(2): 1991: 52-56

Colour defects found in fresh meat (factors influencing discolouration rate), restructured meat products, cooked uncured meat products, cooked cured meat products (pale colour, fading during storage, green patches, surface greening and green rings and cores) are discussed in this paper. Possible causes and suggestion for prevention of defects are also covered. SRA

415

Mann (N), Sinclair (A), Watson (M) and O'Dea (K). **Evaluation of rapid fat determination in meats using the CEM automated analyser.** *Food Australia* 43(2): 1991: 67-69

The study was conducted to compare the CEM rapid automated method for detn. of fat in meat with manual extraction technique. The automated technique consisted of integrated microwave moisture detn. and dichloromethane fat extraction. This method gave fat values 0.74% (absolute) lower than the manual method for beef, 0.46% lower for lamb, 0.74% lower for chicken, 0.70% lower for pork and 0.66% lower for all meats combined. As the total fat increased, the difference between the two techniques diminshed. For low fat meats the difference between two methods was almost constant. The CEM method does not extract structural phospholipids quantitatively but provides rapid, quantitative extraction of triglycerides in meats. SRA

416

Gasser (U) and Grosch (W). **Aroma extract dilution analysis of commercial meat flavourings.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6): 1990: 511-515

Eight commercial meat flavourings were compared by aroma extract dilution analysis (AEDA). The number of odorants appearing with significant FD factors varied greatly (8 - 33). Some odorants with a high FD factor in the aromagrams of broths prepared from beef and chicken meat also appeared in the aromagrams of the flavourings, e.g. bis(2-methyl-3-furyl)disulphides, the character impact compound for the "meaty" flavour note. Other compounds, e.g. 2-methyl-3-(methyldithio)-furan appeared with a significant FD factor only in the aromagrams of the flavourings. The results indicate that AEDA is a suitable technique for characterizing commercial food flavourings. AS

417

Virgili (R) and Parolari (G). **Quality control in the meat industry by multivariate statistics. The case of raw ham.** *Meat Science* 29(1): 1991: 83-96

418

Tibin (IM) and Melton (CC). **Some microbiological assays of ground beef blended with hydrogenated soybean oil.** *Meat Science* 28(3): 1990: 245-249

Ground beef patties were formulated from beef lean, beef fat and hydrogenated soybean oil. Using the Pearson Square Method, the patties were formed to contain three total fat levels (16, 20 and 24%). At each level, vegetable fat was substituted for 0, 25 or 50% of total fat to end up with nine different blends. Aerobic psychrotrophs and mesophiles of the blends were investigated at 0-, 3-, 6-day intervals. A split-split plot design with two replication was used to differentiate significant and non-significant attributes of the main effect and the corresponding interactions. Results obtained show that total fat level, percentage vegetable fat or replication did not have a significant effect on bacterial numbers of ground beef extended with hydrogenated soybean oil of 70 iodine value. However, the days of storage significantly ($P < 0.001$) affected both the Standard Plate Count (SPC) and Psychrotrophic Plate Count (PPC). The log number of bacteria in both SPC and PPC was found to be higher than SPC, which indicates that the predominant microflora in raw beef products is psychrotrophic in nature. AS

419

Lewis (GJ) and Purslow (PP). **Connective tissue differences in the strength of cooked meat across the muscle fibre direction due to test specimen size.** *Meat Science* 28(3): 1990: 183-194

Systematic variations in the tensile strength of cooked beef *M. semitendinosus* across the muscle fibre direction due to the cross-sectional size of specimens are demonstrated in specimens from (a) longitudinal and (b) transverse slices. The strength perpendicular to the fibre direction of longitudinal slices of thickness 0.25 - 5.75 mm varied by a factor of 2, thicker slices being stronger. This factor of 2 is in approximate agreement with the difference in strength of transverse versus longitudinal slices across the fibre direction. These variations of strength due to specimen geometry are explained on the basis of the increasing likelihood of including a ribbon of the perimysial connective tissue network which is continuous along the whole length of the test piece in larger samples. The breaking strength of small cross-sectional area specimens is likely to be dominated by the strength of the endomysial-perimysial junction. Larger cross-sectioned specimens, by including continuous strands of the perimysial network, have higher strengths resulting from the necessity to break these strands. These findings highlight the need to specify specimen dimensions in tensile test results. They also show that by manipulating specimen geometry, the relative magnitude of the two mechanisms of connective tissue fracture (endomysial-perimysial separation and perimysial strand fracture) may be assessed. AS

420

Smith (JJ), Ockerman (HW) and Plimpton (RF). **The effect of cooking temperature, holding temperature and holding time on proximate analysis, aerobic plate count and coliform count on restructured beef roasts.** *Journal of Food Protection* 53(5): 1990: 396-399

421

Vanderwert (W), Bechtel (PJ), DeVol (DL), McKeith (FK), Berger (LL), Shanks (RD). **Factors related to longissimus tenderness among alternate methods of lean beef production.** *Journal of Food Quality* 12(6): 1989: 445-453

422

Oellingrath (IM), Iversen (A) and Skrede (G). **Quantitative determination of myoglobin and heamoglobin in beef by high performance liquid chromatography.** *Meat Science* 28(4): 1990: 313-320

423

Leonard (SM) and Larick (DK). **Effect of vacuum-packaged frozen storage, after cooking, on the phospholipids of hereford and bison.** *Meat Science* 28(4): 1990: 299-311

424

Bernthal (PH), Booren (AM) and Gray (JI). **Effect of reduced sodium chloride concentration and tetrasodium pyrophosphate on pH, water-holding capacity and extractable protein of prerigor and postrigor ground beef.** *Meat Science* 29(1): 1991: 69-82

425

Sheard (PR), Jolley (PD) and Rush (PAJ). **Effect of temperature on the particle size distribution of flake-cut meat.** *International Journal of Food Science and Technology* 26(2): 1991: 199-205

Bovines

426

van Laack (RLJM) and Smulders (FJM). **Colour stability of bovine *Longissimus* and *Psoas major* muscle as affected by electrical stimulation and hot boning.** *Meat Science* 28(3): 1990: 211-221

Mutton

427

Babiker (SA), El Khider (IA) and Shafie (SA). **Chemical composition and quality attributes of goat meat and lamb.** *Meat Science* 28(4): 1990: 273-277

Chemically, goat meat had significantly ($P < 0.05$) less intramuscular fat and significantly ($P < 0.001$) more moisture than lamb. The sarcoplasmic protein concn. of the goat meat was significantly ($P < 0.001$) greater than that of lamb while the myofibrillar protein concn. was similar in the two species. Goat meat was darker red in colour than lamb. It had significantly ($P < 0.001$) superior water-holding capacity and less cooking losses than lamb. Meat flavour was significantly ($P < 0.05$) less strong in goat meat than in lamb. AS

Ewes

428

Mahendrakar (NS), Dani (NP), Ramesh (BS) and Amla (BL). **Effect of post-mortem conditioning of ewe carcasses on instrumental texture profile of cooked thigh muscles.** *Meat Science* 28(3): 1990: 195-202

The semimembranosus (SM) and semitendinosus (ST) muscles were removed from 18 four to five yr old Bannur breed ewes which were slaughtered and carcasses (six each) suspended by the (a) Achilles tendon at 26 plus or minus 2 C for 1 h before cutting (b) Achilles tendon at 2-3 C for 24 h and (c) Pelvis at 26 plus or minus 2 C for 7 h followed by chilling at 2-3 C for 17 h. The muscles were cooked by boiling in a water bath for 30 min or by heating in a pressure cooker for 20 min and the tenderness measured with a Warner-Bratzler tenderometer. Hardness, cohesiveness, elasticity and chewiness were also measured with a General Foods Texturometer. With conventional hanging at 2-3 C the SM muscle was the toughest and the ST muscle the most tender. By holding carcasses at 26 plus or minus 2 C for 1 h before cooking there was an increased tenderness. The most tender meat was found from carcasses which were suspended by the pelvis at 26 plus or minus 2 C before chilling. The increase or decrease in shear values were resp. associated with contraction or stretching of muscles effected by carcass conditioning treatments. In contrast, thermal shrinkage due to cooking had opposite effects so that greater thermal shrinkage resulted in lower shear values. The shear values from the Warner-Bratzler tenderometer did not correlate well with the parameters measured by the General Foods Texturometer. AS

Lambs

429

Moore (VJ). **Increase in retail display of frozen lamb chops with increased loin storage time before cutting into chops.** *Meat Science* 28(3): 1990: 251-258

There is a steady deterioration of the colour of lamb chops during frozen storage. Storing meat in carcass form or as primals before cutting and packaging minimizes the exposure of the meat surfaces to deteriorating environmental effects. This experiment examines the effects of storage conditions (form, time and temp.) on the display life of frozen chops. Loins were removed from recently frozen carcasses and stored for 0, 10, 20 or 30 wks at temp. of -5 C, -10 C and -20 C. Chops were cut from the stored loins, packaged in oxygen permeable film, stored in the dark at -20 C for 0, 4, 8 or 12 wks and then displayed at -20 C under continuous lighting. The retail display life of the chops was assessed by an experienced colour panel. The most rapid colour deterioration occurred in chops cut from unstored frozen loins and held for 12 wks prior to display (display life of less than 1 day). Chops cut from loins stored for 30 wks at -20 C, and then held for 12 wks prior to display had a display life of 23 days. Both increased loin storage temp. and an increased duration of chop storage before display decreased the retail display life. This study indicates that frozen storage of cut chops for as little as 4 wks reduces the display life by almost 80% so that whole carcasses or loins rather than cut chops should be shipped to distant markets. AS

Sheep

430

Aulhus (JL) and Price (MA). **Endurance-exercised growing sheep: I. Post-mortem and histological changes in skeletal muscles.** *Meat Science* 29(1): 1991: 43-56

A study was conducted with Suffolk ram lambs to determine whether chronic endurance exercise would affect post-mortem changes in muscle tissue. Muscle fibre diameters, sarcomere lengths, fibre types, and pH and temp. declines were measured in five skeletal muscles (semimembranosus, SM; vastus lateralis, VL; semitendinosus, ST; psoas major, PM; gastrocenemius, G). The exercise had no significant effect on muscle size or muscle fibre diameter in any of the muscles studied. However, endurance-exercised sheep had significantly shorter sarcomeres in all five muscles than their non-exercised counterparts. The pH decline curves differed among muscles; those having the highest proportion of glycolytic fibers had the

slowest rates of pH decline. The increased proportion of slow-twitch fibres in the SM, VL, ST and G associated with the excercise regime had little effect on the post-mortem pH decline. However, the ST also had a significant exercise-associated increase in the proportion of the oxidative-glycolytic fibres (intermediate) and was the only muscle in which excercise influenced the rate of pH decline significantly. AS

431
Aalhus (JL), Price (MA), Shand (PJ) and Hawrysh (ZJ). **Endurance - excercised growing sheep: II. Tenderness increase and change in meat quality.** *Meat Science* 29(1): 1991: 57-68

A study was conducted to examine the effect, in ram lambs, of chronic treadmill exercise, on meat quality. A secondary objective was to relate changes in tenderness to metabolic and chemical phenomena. Meat quality traits, including instrumental measurement of tenderness and thaw and drip losses, were recorded for two muscles from the hind limb (semimembranosus, SM; vastus lateralis, VL). Chemical analyses, including total and soluble collagen, total and myofibrillar protein, and myofibrillar fragmentation were also performed. Muscles from excercised sheep were significantly more tender than muscles from their control counterparts. A larger myofibrillar protein to total collagen ratio was observed in the VL muscles from excercised sheep ($P < 0.01$) which probably contributed to the observed increase in tenderness. However, similar results were not observed for the SM muscle. The tendency for a slightly higher pH at similar post-mortem temp. in meat from excercised sheep may also have contributed to the increased tenderness. AS

Pork

432
Sheridan (JJ), Walls (I) and Levett (PN). **Development of a rapid method for enumeration of bacteria in pork mince.** *Irish Journal of Food Science and Technology* 14(1): 1990: 1-15

433
Jones (SDM), Greer (GG), Jeremiah (LE), Murray (AC) and Robertson (WM). **Cryogenic chilling of pork carcasses. Effects on muscle quality, bacterial populations and palatability.** *Meat Science* 29(1): 1991: 1-16

Pigs

434
Prusa (KJ), Love (JA) and Miller (LF). **Composition and sensory analysis of rib chops from pigs supplemented with porcine somatotropin (pSt).** *Journal of Food Quality* 12(6): 1989: 455-465

435
Prusa (KJ), Love (JA) and Miller (LF). **Composition, water-holding capacity and pH of muscles from pigs supplemented with procine somatotropin (pSt).** *Journal of Food Quality* 12(6): 1989: 467-474

Sow

436
Cordray (JC), Huffman (DL) and Egbert (WR). **Restructured pork from hot-processed sow-meat: Effect of particle size and blend ratio.** *Journal of Food Protection* 52(8): 1989: 581-585

Products

437
Wedzicha (BL) and Mountfort (KA). **Reactivity of sulphur dioxide in comminuted meat.** *Food Chemistry* 39(3): 1991: 281-297

Poultry

438
Izat (AL), Driggers (CD), Colberg (M), Reiber (MA) and Adams (MH). **Comparison of the DNA probe to culture methods for the detection of *Salmonella* on poultry carcasses and processing waters.** *Journal of Food Protection* 52(8): 1989: 564-570

In a series of 5 experiments a total of 269 broiler carcass and chill tank water samples were tested for the presence of *Salmonella* using the DNA probe and the standard cultural method. Carcasses were sampled using a whole carcass rinse technique. Samples consisted of pre-(48) and post-chill (103) carcasses, and pre-chill (48) and chill (70) tank water. Samples to be evaluated with the DNA probe were subjected to three preenrichment/enrichment procedures to determine the most accurate and reliable enrichment procedure to use with the DNA probe assay. Direct enrichment in Selenite Cystine followed by 24 h incubation in Gram Negative broth allowed for recovery of 0.03 salmonellae/ml from carcass rinse and from pre-chill water using either the standard cultural method or the DNA probe. Pre-enrichment in lactose broth produced inaccurate results for prechill carcass and pre-chill water samples using the DNA probe assay, and may be due to extreme microbiological competition. No false positive results were obtained using the DNA probe assay for any of the four sample types. AS

Chickens

439

Kesava Rao (V), Ravindra Sharma and Kowale (BN). **Preservation of chicken meat by freezing.** *Poultry Guide* 28(11): 1991: 25-30

Still air freezing, blast freezing, liquid or brine freezing, freezing with liquified gases and plate freezing are some methods which could be employed for freezing poultry meat and a comparison has been made of these. The factors influencing the rate of freezing such as the size and shape of the package: size and shape of the product: the medium in which the foods are packed: quantity food frozen: and packaging material used have been described. To achieve rapid freezing turbo-chills are used to allow fast moving air. Several qualitative changes in carcass colour, tenderness and flavour, bone taint during freezing and these have been reviewed. 18 references. GS

440

Thind (SS), Bawa (AS), Kashmira Singh and Pardeep Sharma. **Effect of supplementing poultry meat with textured soy on the quality of loaves.** *Journal of Food Science and Technology (India)* 28(6): 1991: 394-395

The chicken meat loaves were prepared from culled hens and broiler breeder males using minced meat in combination with various levels of textured soy (TS). The TS was incorporated at levels of 10, 20, 30, 40 and 50% of the meat. The sensory evaluation revealed that loaves containing TS upto 30% level were acceptable. The broiler samples were preferred to hens but the preference was not significantly different. The loaves had a shelf-life of about 12 days at refrigeration temp. AS

Quails

441

Prabhakar Reddy (K), Narahari (D) and Kumara Raj (K). **Effect of polyphosphate chilling on the quality of quail meat.** *Journal of Food Science and Technology (India)* 28(6): 1991: 368-370

Spent Japanese quails (240) with equal number of males and females were dressed and chilled in 3 and 6% sodium tripolyphosphate (STPP) solution. The chilled carcasses were stored at 4 plus or minus 1 C for 6 days and at - 18 plus or minus 1 C for 60 days and evaluated microbiologically and for sensory qualities. Both the levels of STPP treatment retarded the growth of aerobic mesophilic counts and psychrophillic bacteria on the surface of quail carcasses during 60 days of frozen storage. STPP treatment has improved all the sensory characteristics. Chilling for 6 h gave better scores for colour, appearance, and flavour. In general, fresh quail carcasses, females and breast muscle gave better sensory scores than their counterparts. AS

Poultry products

442

Kondaiah (N) and Panda (B). **Relevance of poultry products technology for poultry industry development.** *Poultry Guide* 28(10): 1991: 21-31

This exhaustive review covers processing, storage, marketing and utilization of poultry meat and its products. The speciality of poultry meat is indicated and the methods to increase the demand for poultry products has been outlined. Stabilization of the market price is one of the key factors. A var. of products that could be prepared and the methodology of product development has been indicated. The quality expected from the poultry meat and the process of deboning and the various parameters that affect the quality have been tested. Methods of utilization of spent hens (culls), advantages in the incorporation of poultry meat in mutton products, and the possibility of preparing enrobed (coated) products have also been outlined. Proper packaging so as to have proper shelf life during distribution and home storage is also essential aspects which are briefly illustrated. A brief mention is also made about eggs and egg products including the increasing trend noted in egg consumption in India and also the need for stabilization of egg prices throughout the yr. AS

Eggs

Egg white

443

Anon. **Whipping agent replaces egg white.** *Prepared Foods* 160(3): 1991: 62

An egg white replacer which is low in sodium, cholesterol-free, *Salmonella* free and which contains high levels of soluble fibre and carbohydrates has been produced. This ingredient can be stored at room temp. and food products made with it do not stale quickly. GS

SEAFOODS

444

Gopakumar (K). **Major marine products for export - fresh, frozen and value added from India.** *Seafood Export Journal* 23(8): 1991: 11-16

The major marine products exported from India constitute frozen shrimp (block and individual quick frozen (IQF)), frozen lobsters, frozen squid, and cuttle fish. The quantity of individual products exported, their processing methodology, and the packaging system adopted are the aspects covered in this review. SRA

445

Lovell (RT). **Foods from aquaculture.** *Food Technology* 45(9): 1991: 87-92

The purpose of this report is to introduce the concept of aquaculture for food production, its evolution and benefits, the species cultured such as marine shrimp, channel catfish, rainbow trout, salmon, crawfish, tilapia, carp and marine fish. The nutritional values (the caloric value, the protein percentage, the fatty acid composition and the n-3 HUFA composition) of fish, the quality of the products, the market forms and the future of aquaculture products are covered in this article. CSA

Crabs

446

Ingham (SC) and Moody (MW). **Enumeration of aerobic plate count and *E. coli* during blue crab processing by standard methods, Petrifilm ™, and Redigel ™.** *Journal of Food Protection* 53(5): 1990: 423-424

Mussels

447

Luckas (B), Thielert (G) and Peters (K). **The problem of the selective determination of PSP-toxins in mussels.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6): 1990: 491-495 (De)

Levels of paralytic shellfish poisoning (PSP) toxins in shellfish are routinely determined by mouse bioassay. In order to improve the qualitative and quantitative detn. of PSP toxins, chromatographic techniques with fluorescence detection have been developed. These HPLC methods and the HPLC/MS coupling were used to determine a second PSP toxin which was found, in addition to saxitoxin, in canned Spanish mussels. These canned mussels were rejected in 1986 by the German food control because PSP concn. were too high. It has been shown that these samples contained mainly de-saxitoxin. AS

Prawns

448

Nirmala Thampuran and Gopakumar (K). **Microbial profile of tropical prawn *Metapenaeus dobsoni* during frozen storage.** *Journal of Food Science and Technology (India)* 28(6): 1991: 371-374

Microbiological changes of Indian prawn, *Metapenaeus dobsoni* frozen as whole (W) headless-shellon (HL) and peeled and deveined (PD) were investigated. Exposure to freezing temp. caused mortality of major bacteria present in prawn. 83.67%, 79.48% and 52.90% of cells being destroyed in W, HL and PD types. Frozen storage for a period one month caused less destruction (13.58%, 16.90% and 9.78%). After two months, death was very slow and gradual. The results point to a difference in the survival rate of bacteria present on PD prawn. Qualitatively, various genera were affected differently by freezing and frozen storage. *Vibrio* spp. were the most sensitive and *Micrococcus* spp. the most resistant. AS

Scallops

449

Chung (SL) and Merritt (JH). **Physical measures of sensory texture in thawed sea scallop meat.** *International Journal of Food Science and Technology* 26(2): 1991: 207-210

An instrumental method of texture measurement for scallop (*Placopecten magellanicus*) meats after frozen storage has been developed to replace the sensory method. Non-destructive and destructive compressive forces at 50 and 80% deformation resp. and shear peak force gave significant correlation coeff. of 0.89, 0.78 and 0.82 resp. with sensory evaluation of the cooked meats. The coeff. of variation associated with the compression method was smaller, however, than with the shear method. AS

Shrimps

450

McEvily (AJ), Radha Iyengar and Otwell (S). **Sulphite alternative prevents shrimp melanosis.** *Food Technology* 45(9): 1991: 80, 82-86

Trials were conducted on brown shrimp (*Penaeus aztecus*) and pink shrimp (*P. duorarum*) to evaluate

the functionality of 4-hexylresorcinol as a processing aid for the inhibition of shrimp melanosis (shrimp blackspot) with dips using small test units. The shrimp samples were dipped into 1 L of various test solutions consisting of sea water (final pH 7.5 to 8.0; salinity 3.5%), 1.25% sodium metabisulphite and 50 p.p.m. 4-hexylresorcinol at ambient temp. for 1 min. Following the dip, the shrimps were drained and stored on crushed ice for 12 days and then the development of shrimp melanosis was evaluated. The results of the study focusses on the effective concn. of 4-hexylresocinol, the amount of shrimp that can be processed with a single dip solution and the residuals on shrimp meat. The implications of these results are discussed in this article specifying that 4-hexylresorcinol is the most effective resorcinol derivative tested to date for the inhibition of shrimp melanosis. CSA

Fish

451

Karunasagar (I) and Indrani Karunasagar. **Harvest and post-harvest microbiology of fishes.** *Indian Journal of Microbiology* 31(3): 1991: 211-229

An exhaustive review covering microbiology of fresh fish, effect of handling and icing on spoilage of fish, bacteria of public health significance in fish, bacteriological quality of fishes and its evaluation, and future research areas. Tabulated information is given on bacterial load in fishes from various regions of India, media used for enumeration of fish spoilage bacteria, distribution of *Clostridium botulinum* serotypes in tropical marine environments, pathogenic *vibrios* associated seafoods and microbiological tolerance limits for fresh fish in some countries. SRA

452

Taliat (JJ). **Domestic marketing of fishery products as support to export industry.** *Seafood Export Journal* 23(8): 1991: 26-29

Article briefly covers, fish consumption pattern in India, interstate flow of fish, modes of transportation, marketing intermediaries, price spread, demand for fish, and the supply position. Useful statistics on fish handling and consumption are given. SRA

453

Cronin (DA) and O'Sullivan (K). **Processed fish products as sources of n-3 polyunsaturated fatty acids.** *Irish Journal of Food Science and Technology* 14(1): 1990: 17-24

The role of the n-3 polyunsaturated fatty acids (PUFAs) of fish oils in alleviating the symptoms of coronary heart disease (CHD) is now well recognised. In this study, the flesh oil contents and the levels of n-3 PUFAs therein were used to assess the status of a range of popular processed fish products as sources of these compounds. Fat content was the most important determinant of n-3 PUFA status, with smoked whole fish providing the highest intake. While canned fish were more variable commodities, exhibiting a wider spread of fat levels, they were nevertheless a very good source of these acids, and on average, yielded about 2 g of the latter per 100 g of fish consumed. Significant amounts (24 - 49%) of n-3 PUFAs were partitioned into the canning medium for products canned in vegetable oils. Grilling of smoked whole fish was found to have no effect on n-3 PUFA levels in the extracted flesh oil. AS

454

Haaland (H) and Njaa (LR). **Effects of sodium nitrite and formaldehyde on the lysine content of fish muscle. Model experiments.** *Food Chemistry* 39(3): 1991: 337-345

Fish muscle pieces were treated under anaerobic conditions and at different pH values with sodium nitrite and formaldehyde alone and in combination. Lysine and tyrosine were the only amino acids affected under the conditions chosen. Lysine was reduced by some 20% by nitrite alone and by nitrite and formaldehyde in combination at 24 h reaction time at pH 5.0, which was the lowest pH value tested. At higher pH values the effect was negligible. Formaldehyde had no effect on lysine. Tyrosine was not affected by nitrite, but formaldehyde alone and in combination with nitrite had a dose-related effect resulting in almost complete loss at the highest levels tested. This effect of formaldehyde was probably an artefact due to a reaction between tyrosine and formaldehyde during hydrolysis of the fish muscle pieces. AS

Cat fish

455

Ingham (SC). **Lactic acid dipping for inhibiting microbial spoilage of refrigerated catfish fillet pieces.** *Journal of Food Quality* 12(6): 1989: 433-443

Subdivided catfish fillets were dipped in chilled (7 C) solutions of 1.70% and 2.55% (v/v) lactic acid (LA) for 10 min. Control pieces were not dipped. All pieces were individually placed in sterile plastic bags and stored either at 7 C for 3 days or on ice in a 2 C cold room for 6 days. Aerobic plate count (APC) was periodically determined using plate count agar pour plate and Petrifilm ™ SM film methods. At 7 C, APC

for both LA treatments was significantly ($P < 0.05$) lower than for controls during 3 days of storage. Day 3 APC values for 1.70% and 2.55% LA samples were lower than controls by 1.3 and 2.3 logs, resp. Similarly, after 6 days at 2 C the APC values for 1.70% and 2.55% LA samples were 1.3 and 3.1 logs lower, resp., than for control samples. Throughout storage at both temp., 2.55% LA samples had significantly ($P < 0.05$) lower APC than 1.70% LA samples. No significant ($P < 0.05$) difference was observed between pour plate Petrifilm ^{TM} APC methods, although APC values for the latter method were consistently slightly higher. Untrained sensory evaluation panelists could not consistently distinguish between control and 1.70% LA catfish pieces that were dipped in batter, breaded and fried. Control, 1.70% LA, and 2.55% LA-dipped pieces were not rated as significantly different ($P < 0.05$) in whiteness of flesh, tartness and overall flavour acceptability. Acid dipping of catfish could be useful for extending the refrigerated shelf-life of unfrozen catfish fillets. AS

Cod

456

Sych (J), Lacroix (C), Adambounou (LT) and Castaigne (F). **The effect of low- or non-sweet additives on the stability of protein functional properties of frozen cod surimi.** *International Journal of Food Science and Technology* 26(2): 1991: 185-197

The cryprotective effect of low- or non-sweet additives, Palatinit ^{R}, Polydextrose^{R}, casein hydrolysate and fish protein hydrolysate (8% w/w) as well as lactitol (at 4% and 8% w/w) were compared to an industrial control containing sucrose/sorbitol (8% w/w) and a control without additive in cod surimi stored at -20 C for 4 months. Freeze-induced protein denaturation was evaluated monthly by salt extractable protein and differential scanning calorimetry analyses of surimi followed by texture and expressible moisture analyses of surimi cooked gels. Results revealed that protein functionality was similarly maintained during frozen storage by lactitol, Palatinit^{4} and Polydextrose ^{R} when incorporated in cod surimi at the 8% level. Surimi gels could be produced with textural attributes comparable to 8% w/w sucrose/sorbitol surimi gels, and the level of lactitol in cod surimi could be reduced at 4% w/w without significant alteration of cryoprotection. Some benefits in gel-forming properties were obtained by adding 8% casein hydrolysate to cod surimi. AS

Ray fish

457

Pastoriza (L) and Sampedro (G). **Loss of urea from the flesh of ray (*Raja radiata*) during the canning process.** *International Journal of Food Science and Technology* 26(2): 1991: 211-213

Cooking frozen ray in water or in steam, followed by canning in brine reduced the urea content of the muscle 4 - 5 fold. BV

Trout

458

Sato (K), Ohashi (C), Ohtsuki (K) and Kawabata (M). **Type V collagen in trout (*Salmo gairdneri*) muscle and its solubility change during chilled storage of muscle.** *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1222-1225

Post-mortem changes of type I and V collagens in rainbow trout muscle were examined in relation to the softening of fish muscle during chilled storage. Degradation of helical regions of collagens was not detected. On the other hand, the solubility of type V collagen increased significantly, while that of type I collagen did not change. These facts suggest that degradation of nonhelical regions or intermolecular cross-links occur preferentially in type V collagen. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

459

Loyola (E), Martin-Alvarez (PJ), Herraiz (T), Reglero (G) and Herraiz (M). **A contribution to the study of the volatile fraction in distillates of wines made from Muscat grapes (Pisco).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6): 1990: 501-505

The use of a programmed temp. vapourizer, operated in the solvent split mode, was evaluated in order to eliminate the concn. step required to analyze aroma extracts. Volatile constituents of Pisco, a distillate of wines made from Muscat grapes, were quantified and principal component analysis and cluster analysis were applied to the data obtained. AS

480

Cantarelli (C). **The use of immobilized yeasts in wine fermentation.** *Italian Journal of Food Science* 1(3): 1989: 3-20

Ethanolic fermentation with immobilized yeast has been applied or proposed in a wide number of cases, including wine making. Specific applications include: must fermentation to obtain young, neutral white and rose wines as well as re-fermentation of various kinds of wines: production of sprakling wines; deacidification by malo-alcoholic fermentation; Sherry-like continuous "flor" processing. In this paper, the present knowledge about yeast immobilization methods, metabolic behaviour and processing conditions are reviewed, considering positive features and various constraints in terms of innovative possibilities for the wine industry. AS

Non-alcoholic beverages

Fruit juice

Muskmelon juice

461

Teotia (MS), Manan (JK), Berry (SK) and Sehgal (RC). **Beverage development from fermented (*S. cerevisiae*) muskmelon (*C. melo*) juice.** *Indian Food Packer* 45(4): 1991: 49-55

Muskmelon (*Cucumis melo*) juice extracted from fruits was unfit for table purpose. It was fermented by *Saccharomyces cerevisiae* for 96 h, cooled, filtered, filled in glass bottles, sealed and stored at room temp. (30 plus or minus 5 C). The fermented juice contained 6.5% (w/v) alcohol and possessed good sensory quality when adjusted to 10 and 12 degree brix with TSS: acid ratio of 34.5 and 41.4 resp. The ready-to-serve beverage prepared from this fermented juice contained 2.2% (w/v) alcohol and possessed excellent sensory quality at 12 degree Brix and TSS:acid ratio of 44.4 followed by 10 degree Brix and TSS:acid ratio of 37.3. The fermented juice could be stored upto 6 months at room temp. VKR

Tea

462

Mahajan (V), Arora (DS) and Sabherwal (U). **Antibacterial activity of some tea samples.** *Indian Journal of Microbiology* 31(4): 1991: 443-445

Antibacterial activity of Indian green and black tea (CTC and orthodox) tea against clinically important Gram positive and negative bacteria has been tested. Aqueous extract of Japanese green tea was prepared by brewing in distilled water and the antibacterial activity was tested. Results showed that Gram positive and Gram negative bacteria were inhibited to varying extent. The former (*Staphylococcus aureus* and *Streptococcus faecalis*) were more sensitive than the latter. In general green tea was more effective than black tea. Green tea (Indian and Japanese) inhibited growth of *Klebsiella pneumoniae* while black tea was ineffective. *Enterobacter aerogenes* was sensitive only to Japanese green tea. Amongst black tea extracts orthodox tea was more inhibitory than CTC tea to *Pseudomonas aeruginosa* and *Shigella flexneri*. *Escherichia coli* was sensitive to all tea extracts. Bactericidal activity was apparent within 1 h: in *Salmonella typhi* viability was reduced to 0% within 2 h but in other organisms except in *P. aeruginosa* it reached 0% in 20 h. Overall results show that green tea was a better inhibitor of bacteria than black tea and Indian green tea extract is as effective as Japanese green tea extract in its antibacterial activity. SRA

463

Yamanishi (T), Botheju (WS) and De Silva (MJ). **An index for assessing the quality of UVA seasonal black tea.** *Sri Lanka Journal of Tea Science* 58(1): 1989: 40-49

Studies of the methylene chloride extractable steam colatiles of seasonal black teas from UVA district showed that pentanal, (E)-2-hexenal, (Z)-3-hexenyl acetate, (Z)-3-hexenol, linalool oxide I, linalool oxide II, linalool, phenyl-acetaldehyde, (Z)-3-hexenyl hexanoate, nerol, methyl salicylate, geraniol, B-ionone/cisjasmone, nerolidol and indole are the main flavour contributing constituents found in the aroma complex. Analysis of the flavour profiles of teas obtained during the UVA flavour season from several estates in the UVA revealed the existence of a correlation between linalool/(E)-2-hexenal ratio and the prices they fetched at the tea auctions. The significance of employing this index in assessing the quality of seasonal teas from Sri Lanka is discussed. AS

464

Agarwal (B). **Factors affecting quality of tea during processing.** *Sri Lanka Journal of Tea Science* 58(1): 1989: 64-72

The factors affecting quality and flavour during manufacture of black tea as well as the overall influence of some other factors on tea manufacture have been discussed. AS

465

Sud (RG) and Badyal (J). **Varietal and seasonal variations in chemical constituents of tea (*Camellia sinensis* (L.) O. Kuntze) in Himachal Pradesh.** *Sri Lanka Journal of Tea Science* 58(1): 1989: 73-78

Varietal and seasonal variations in chemical constituents in 14 seed jats of tea were studied throughout four seasons during 1986 and 1987. Better quality teas were seen in the spring and summer seasons. The seed jats Dhoedham and Khorijan produced comparatively better quality teas followed by Kalline, Runglee and Doom Dooma under Palampur conditions. AS

466

Anandavijayan (S), Jayaweera (H) and Herath (NL). **Effect of sifting of dhool during fermentation on quality of manufactured black tea.** *Sri Lanka Journal of Tea Science* 58(2): 1989: 111-117

An investigation was carried out in the Talawakele region to find whether periodical sifting of dhools as opposed to the standard practice of non sifting could result in a better quality of tea. The results of this study revealed that teas manufactured in the normal manner produced better quality teas. AS

FATS AND OILS

Fats

467

Joglekar (MV), Momin (SA) and Subrahmanyam (VVR). **Butter-like products from indigenous hard fats.** *Journal of the Oil Technologists Association of India* 22(4): 1990: 70-72

Suitability of the hard fats as such and after subjecting them to interesterification reaction are reported for making butter-like products (BLP). Refined, bleached and deodourised sal fat (*Shorea robusta*) (SF) and mango (*Mangifera indica*) fats (MF) from industry and lab. refined and bleached kokum (*Garcinia indica*) fat (KF) and commercial coconut oil (CO) were used in the study, and found that a co-randomised blend of SF, KF and CO (60:30:10) gives good quality BLP. Alternatively, SF and liquid oil blends after interesterification can be hardened by blending directed interesterified SF with it. SF, MF and KF are closer to even distribution and are non-plastic: they are not suitable as such for making spreads: their randomised or co-randomised products which are more plastic can be used to get spreads of good quality BLP. By using the modified hard fats or their oleins, spreads having naturally occurring unsaturated acids can be made, and hydrogenation can be totally avoided in the production of spreads and margarines. SRA

Oils

468

Walde (P) and Nastruzzi (C). **Application of a new, simple and economic colorimetric method for the determination of non-esterified fatty acids in vegetable oils.** *Food Chemistry* 39(3): 1991: 249-256

The amount of non-esterified fatty acids in 8 different vegetable oil samples has been determined by two different methods: (a) with a standard titration procedure, and (b) with a new colorimetric method which utilizes phenol red solubilized in reverse micelles. The results obtained by the two methods are in good agreement, although the standard deviation in the case of the phenol red method is significantly higher compared with the conventional titration. The main advantage of the new colorimetric method is an economic one: only small amounts of oil samples (less than 0.1 ml) are required and a comparably small amount of organic solvent (less than 5 ml isooctane) is needed. AS

Palm oils

469

Manorama (R) and Rukmini (C). **Nutritional evaluation of crude palm oil.** *Journal of the Oil Technologists Association of India* 22(4): 1990: 83-87

An evaluation was made of the nutritional consequences of feeding crude palm oil (CPO) to weanling albino rats Wistar strain, using refined groundnut oil (GNO) and refined palm oil (RPO) as controls. CPO and RPO had lower iodine values than GNO due to a higher % of saturated fatty acids. CPO had higher acid value and unsaponifiable matter than RPO. Palm oil is a saturated fat where palmitic and oleic acids predominate each around 42% with minor amounts of linoleic acid (10%) and trace of myristic acid. Nutritional study done for 28 days did not reveal difference in body wt. of animals fed these oils. Protein digestibility, dry matter digestibility, and NPU of the diets containing these fats were not different. No abnormality in liver and heart on 4 wk feeding of CPO was noted. Hematological parameters like RBC's, WBC's, packed cell volume and hemoglobin content did not show any significant difference between groups fed CPO, GNO and RPO. Organ wt. (liver, heart, kidney, ovary, testis, spleen and lung) of rats fed GNO, CPO and RPO for 4 wk did not show any change when dissected. Lipid profile of rats fed these oils for 90 days did not show any significant differences in

serum cholesterol levels, but triglyceride levels of CPO and RPO groups were higher than GNO. Crude palm oil did not show any adverse nutritional effects, and as a diet it is comparable with other commonly used edible oils. SRA

SPICES AND CONDIMENTS

Spices

470

Subbulakshmi (G), Shobha Udipi, Reshma Raheja, Arun Sharma, Padwal Desai (SR), Nair (PM). **Evaluation of sensory attributes and some quality indices of irradiated spices.** *Journal of Food Science and Technology (India)* 28(6): 1991: 396-397

Ground pepper, chilli, coriander, cumin, turmeric and a spice mix (sambar powder) exposed to an adsorbed dose of 10 kGy of gamma-irradiation were studied for microbial and sensory quality changes, if any, on storage for 3 months. No significant differences between the irradiated and non-irradiated samples could be observed in their sensory qualities. While no increase in microbial load in sealed irradiated samples could be observed, those that were irradiated but opened repeatedly for daily use did not show a marginal increase in microbial load. AS

Ginger

471

Mantri (AR) and Agrawal (YC). **Effect of process variations on dried ginger quality.** *Indian Food Packer* 45(4): 1991: 13-16

Drying characteristics and quality of (i) peeled sliced ginger (ii) unpeeled and pretreated with 2% lime solution was compared with that of (iii) peeled ginger and (iv) unpeeled ginger. Dehydration was carried out at 65 C upto 12% moisture content (wet basis). The volatile oil content retention was more in unpeeled ginger, but the pungency, aroma and acceptance to purchase decreased. Unpeeled ginger took more time (2 - 4 folds) for drying. Pretreatment of ginger did not influence the quality. Slicing of ginger improved the acceptance to purchase and also reduced the drying time by 6 folds. VKR

472

Gopalakrishnan (M) and Narayanan (CS). **Determination of ginger oil by solvent partition.** *Indian Food Packer* 45(4): 1991: 35-41

Solvent partition of ginger oil by batch extraction with hexane/ethanol (70%) solvent system afforded a reasonably good flavour enriched fraction (yield - 10%) containing 6% hydrocarbons. Batch extraction with 1:4:2.5 (oil:hexane:ethanol) ratio provided the overall best results. Counter current extraction under identical conditions gave poor yield. Extraction of oxygenated compounds directly with a polar solvent (70% ethanol) also did not give encouraging results. VKR

Pepper

473

Lee (DS), Chung (SK), Kim (HK) and Yam (KL). **Non-enzymatic browning in dried red pepper products.** *Journal of Food Quality* 14(2): 1991: 153-163

Whole pepper and pepper powders, coarse and fine with and without seeds were studied under water activities, storage temp. and packaging atm. The browning being zero order reaction, the rate constant was significantly affected by a_w and temp. and flushing the package with nitrogen showed no advantage. With a_w below 0.3, whole pods or coarse powder with seeds had min. browning. SD

Turmeric

474

Vijayalakshmi (K), Ayyanna (T) and Ratna Sudhakar (T). **Relative susceptibility of turmeric varieties to *Lasioderma serricorne* Fab. during storage under laboratory conditions.** *Bulletin of Grain Technology* 28(2): 1990: 124-127

Relative susceptibility of 5 turmeric var. (Sugandham, Cuddapah, Kasturi, Duggirala and Tekurprta) to *L. serricorne* Fab. was assessed on the basis of adult emergence, developmental period, index of susceptibility and wt. loss due to infestation under lab. conditions. The test var. were categorised into resistant, moderately resistant and susceptible based on their index of susceptibility. Var. Kasturi was moderatley resistant, and other var. were susceptible. KAR

SENSORY EVALUATION

475

Sherman (P). **The complexity of rheological evaluation of the firmness/hardness of solid foods.** *Italian Journal of Food Science* 1(3): 1989: 21-30

The principal factors which influence the rheological evaluation of the firmness/hardness of solid foods are reviewed. They include the sample's shape, its length/diameter ratio, the rate of deformation, surface friction and lubrication. If the aim of the rheological test is to imitate the conditions prevailing during the consumer's sensory evaluation of this textural property then very high rates of deformation must be used. The low rates of deformation that are generally used can lead to erroneous conclusions. Surface friction increases the force required to compress a food. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

476
Kiran Kumari, Shina (MM), Mehto (DN) and Hammed (SF). **Effect of some vegetable oils as protectants against pulse beetle, *Callosobruchus chinensis* (Linn.).** *Bulletin of Grain Technology* 28(1): 1990: 58-60

Experiment was conducted under a typical godown condition with temp. 22.3 plus or minus 4.1 C and RH 70.3% at the Tirhut college of Agriculture, Dholi, Muzaffarpur during 1986 to evaluate the efficacy of mustard oil (*Brassica compestris*), linseed oil (*Linum usitatissimum*), til oil (*Sesamum indicum*), groundnut oil (Arachis hypogoea), *neem oil* (Azadirachta indica), *and mahua oil* (Bassia latifolia) *as grain protectant at 1% level against* Callosobruchus chinensis *(Linn.). Observations were recorded for no. of eggs, no. of adults, damaged grains, by no. and by wt. at the end of one, two and three months. All the vegetable oils tested proved equally effective for reduction in the % of damaged grains by number as well as by wt. KAR*

477
Hadler (MR). **Second generation anticoagulant rodenticides: Their effectiveness and economics.** *International Pest Control* 32(4): 1990: 100-102

Second generation anticoagulants can thus be seen to be most cost/effective, to be more reliable and to offer substantial savings in time and effort when compared with the first generation products. They are also more broadly applicable overcoming the resistance to warfarin which is present in virtually all mouse populations and widespread in rats in Britain today. With rat numbers rising and with costs continually under scrutiny it is important that pest control organisations take full advantage of the greater activity of the second generation anticoagulants to increase the efficiency of their operators. This will have the effect of increasing the capacity for rodent control in their own organisations and expand the total resource available for controlling threatening rat populations. AS

BIOCHEMISTRY AND NUTRITION

478
Koseki (M), Tsuji (K), Kazama (M), Kitabatake (N) and Doi (E). **Interaction between dietary cholesterol or fatty acids and water-soluble fibers and increase in cholesterol excretion by pectin in rats.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990: 559-564

Excretion of cholesterol into the feces increased with the feeding of pectin in rats. Filtration with an ultrafilter of a mixture of cholesterol or free fatty acids with various soluble dietary fibers (SDFs) resulted in low levels of cholesterol or free fatty acids in the filtrate. Glucose, organic acids, and water soluble fatty acids were found in the filtrate even when mixed with SDFs at physiological pH. From these results, it seems that the increase in cholesterol excretion into feces by pectin may be due to the entrapment by SDF matrix or destruction of the micelles of cholesterol or fatty acid with SDF. AS

479
Bello (CO) and Keshinro (OO). **Contribution of mid-day meals to the daily nutrient requirement of school children in Nigeria.** *Food Chemistry* 39(3): 1991: 273-280

480
Matsuda (T), Kato (Y) and Nakamura (R). **Lysine loss and polymerization of bovine** β-lactoglobulin by amino carbonyl reaction with lactulose (4-O-β-D-galactopyranosyl-D-fructose). *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1201-1204

Loss of lysine, protein polymerization, and production of flourescent substances were investigated for bovine β-lactoglobulin stored with lactulose (4-O-β-D-galactopyranosyl-D-fructose) at 50 C and 65% rh for 10 days as a model system for dried milk and milk products supplemented with lactulose. Reactivity of lactulose with protein amino groups was much lower than that of lactose, whereas the lactulose induced the protein

polymerization and production of flourescent substances not less strongly than lactose did. These results suggested that the effect of the amino carbonyl reaction between lactulose and milk proteins on protein nutritive value, i.e., lysine loss, was not very serious but that proteins reacted with lactulose were easily polymerized by cross-linking through lactulose-lysine amino carbonyl adducts. AS

TOXICOLOGY

481

Thompson (DP). **Influence of pH on the fungitoxic activity of naturally occurring compounds.** *Journal of Food Protection* 53(5); 1990; 428-429

The optimum pH for growth for eight toxigenic strains of *Aspergillus* was recorded at pH 6 in unamended potato dextrose broth medium. Significantly less mycelial growth was observed at pH 4 and 8, resp., for all of the fungal strains. In the presence of 1.0 mM of thymol, mycelial growth was completely inhibited at pH 4, 6 and 8 for all the fungal strains. Carvacrol, at the same concn., completely inhibited the growth of the fungi only at pH 4 and 8. At lower concn. (0.1 and 0.5 mM), in the presence of thymol or carvacrol, partial mycelial inhibition at all pH levels was observed with significantly less mycelial growth at pH 4 and 8. AS

482

Kang (Y-J) and Frank (JF). **Evaluation of air samplers for recovery of artifically generated aerosols of pure cultures in a controlled environment.** *Journal of Food Protection* 52(8); 1989; 560-563

All Glass Impinger-30 (AGI-30), Andersen 6-stage Selve Air Sampler (Andersen impactor), Reuter centrifugal air sampler (RCS sampler), and Millipore open type membrane filter sampler (Filter sampler) were evaluated for recovery of artifically-generated aerosols of pure cultures of *Pseudomonas fluorescens*, *Escherichia coli*, *Streptococcus faecalis*, and endospores of *Bacillus subtilis*. Size distribution of the aerosol was analyzed to determine its relationship to air sampler efficiency. Five min after the spray, 71 to 85% of particles were between 1.1 - 3.3 μm in size and 3.5 to 10.4% were smaller than 1.1 μm in size. The Andersen impactor recovered significantly greater numbers of nonsporeforming bacteria, with least variability of recovery and the RCS sampler recovered significantly smaller numbers and exhibited greatest variability of the 4 samples tested. AGI-30 and Filter sampler performance varied depending on the species tested. For recovery of bacterial endospore, the filter and Andersen samplers both recovered greater numbers than the AGI-30 and RCS sampler. The RCS sampler recovered a significantly lower number of spores with the most variable results of the four samplers. Our data indicate that the Andersen impactor is the sampler of choice for recovering microbial aerosols of interest to the food processing industry. AS

483

Yagen (B), Hutchins (JE), Cox (RH), Hagler (WM) and Hamilton (PB). **Aflatoxin B $_1$S: Revised structure for the sodium sulfonate formed by destruction of aflatoxin B $_1$ with sodium bisulphite.** *Journal of Food Protection* 52(8); 1989; 574-577

A promising method for the destruction of aflatoxin B $_1$ in commodities, is treatment with sodium bisulphite to yield a single major product, aflatoxin B $_1$S. On the basis of nuclear magnetic resonance, ultraviolet and infrared spectra, elemental analysis, mass spectroscopy, deuterium labeling and stability to highly acidic conditions, the structure of aflatoxin B $_1$S was established as the 15 α-sodium sulfonate of aflatoxin B $_1$. The formation of aflatoxin B $_1$ products substituted at the 15 position only is unprecedented and implies an unusual mechanism. The formation of a single *trans* addition product under conditions that seemingly rule out a previously proposed free radical mechanism suggested a newly proposed ionic reaction mechanism. The completeness of the reaction and the water solubility of aflatoxin B $_1$S support the promising use of bisulphite to destroy aflatoxin. AS

484

Jimemez (B), Gonzalez (MJ) and Hernandez (LM). **Presence of PCDDs and PCDFs in food for human consumption: A review.** *Food Chemistry* 39(3); 1991; 257-271

This review reports the levels of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in various foodstuffs (fish, meat, vegetables and fruit and dairy products). The data shows that most animal foodstuffs have already been contaminated by those contaminants, even though in very small amounts. The plant products are free of most PCDDs and PCDFs. It is difficult to evaluate the different sources of contamination of food, but muncipal solid waste incinerators and chlorophenol industries are likely to be the most important sources. 28 references. BV

FOOD LAWS AND REGULATIONS

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